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Railway Age

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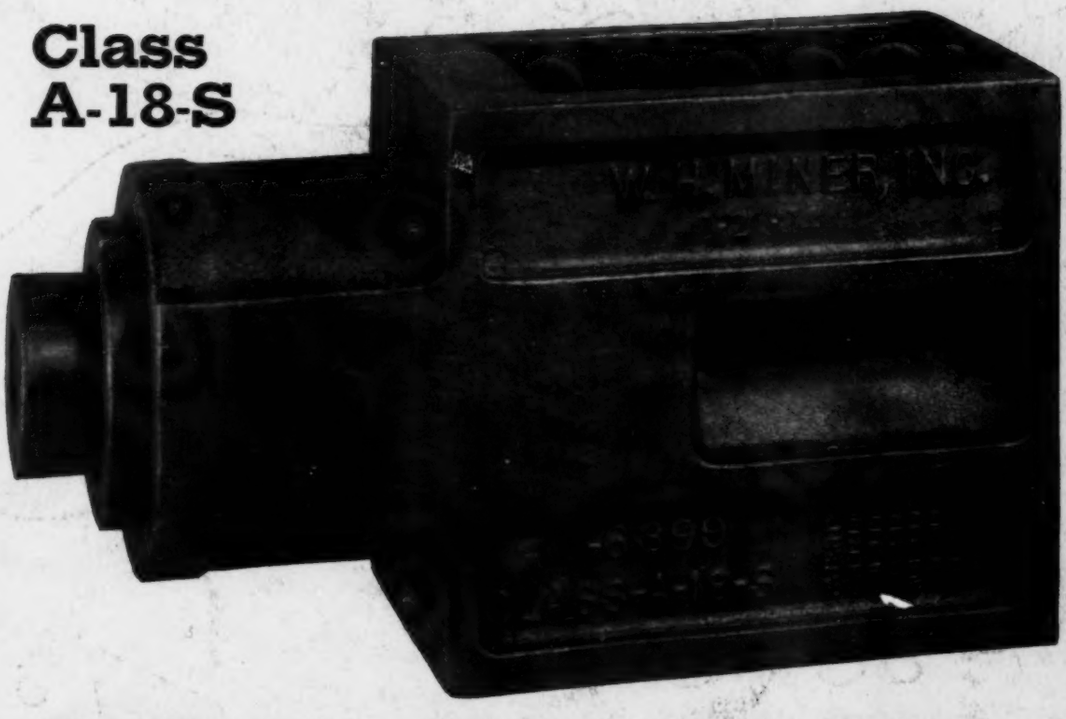

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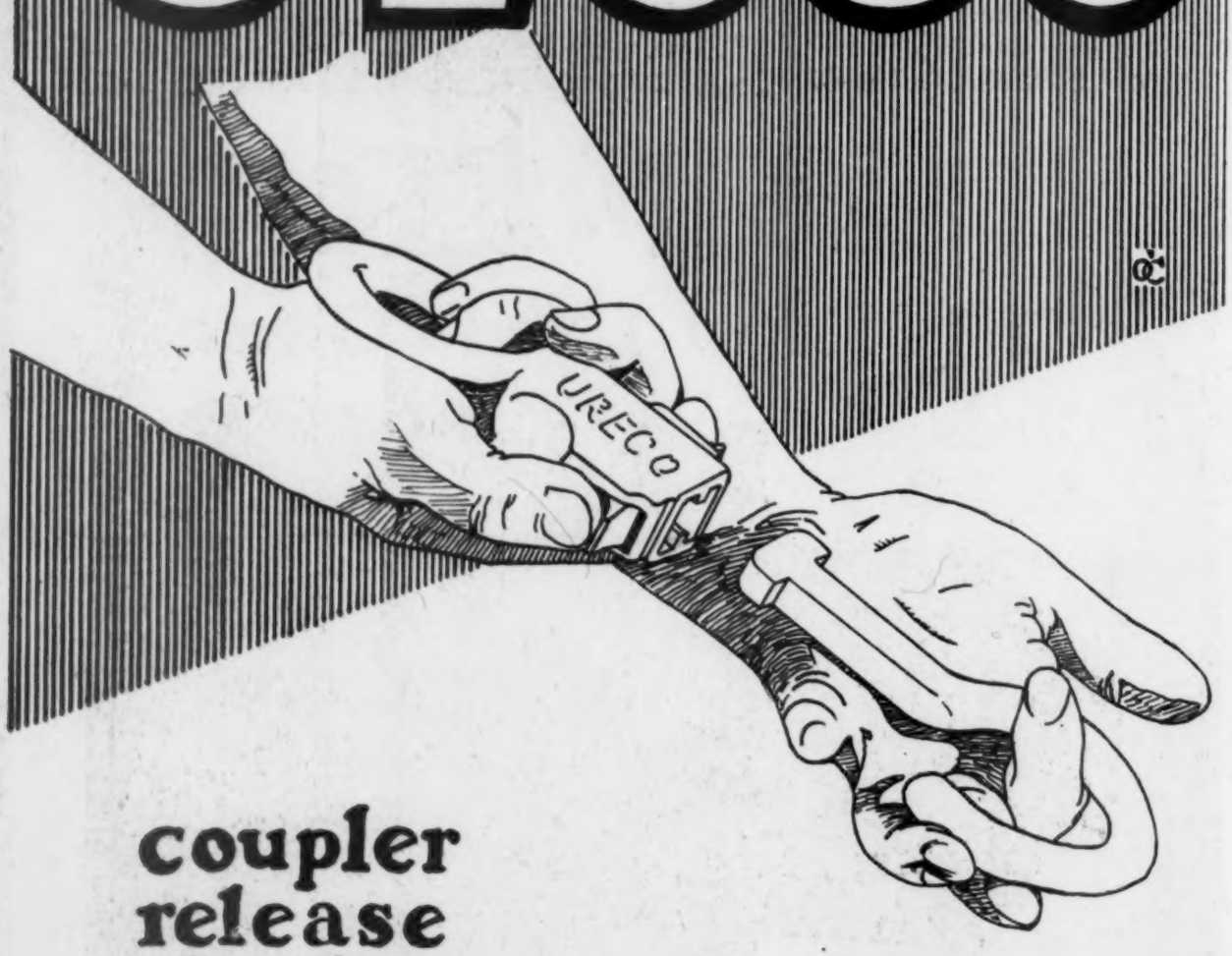

coupler release rigging

New!

UNION RAILWAY EQUIPMENT CO.
McCORMICK BLDG. CHICAGO

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Railway Age

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If a committee of the Mechanical Division is to do really effective work, every member on it must do his full share of the work. This requires an attitude of sincere and hearty support of committee work by all of the railroads. The Mechanical Division is not an association of individuals, but rather of railroads. If an individual is assigned to a committee and accepts the appointment, his road should assume full responsibility for seeing that he is allowed to give the necessary time and effort to participate in the work of the committee. Is this always recognized? A few years ago a mechanical department superintendent in talking with one of his subordinates, discovered that he had not attended the meeting of a committee of the Mechanical Division of which he was a member; he gave as an excuse the pressure of work in his department. He was severely reprimanded and was told that when his chief had approved of his going on the committee, it was with the understanding that he must make good, and that the road, which he must represent with honor and credit, was back of him and would help him to do his part. If the railroads in general do not view the work of the association in this light and if the bulk of the committee work is to be left to the representatives of a few roads which do take their responsibilities seriously, then the results will not be truly representative and the Division cannot measure up to its full possibilities and opportunities.

Backing Up the Committees

Mechanical department officers and foremen are constantly being confronted by more and more complicated problems as greater demands are made upon the locomotives and cars in the interests of more efficient and economical operation. Those who are attending the conventions have a wonderful opportunity for getting at the solution of some of these problems, or at least in making greater progress in overcoming them. It is safe to say that never before has so great an amount of highly specialized railway mechanical engineering talent been concentrated in any one spot as will be found on the Million Dollar Pier during the next eight days. Never before were there so many exhibits or so large an exhibit space. Never was the exhibit space so well used, as is indicated by the small number of firms who are using their space for reception purposes only. The railway supply manufacturers have sent their best experts and trouble finders to explain their exhibits or to meet with the railroad officers and talk over their problems. Then, too, the number of mechanical department officers and foremen at the convention promises to be greater than ever before. Here is a rare opportunity to talk over your problems with men from other roads and get the benefit of their experiences and advice as to the best methods and practices to follow. For the next eight days Atlantic City can be a great university for those who wish to study at first hand under the most favorable auspices the problems of the mechanical department and suggestions for their solution. The opportunity is here; it is up to you to take advantage of it.

A Wonderful Opportunity

Practically no order has been given by an American railroad in recent years for the construction of a compound locomotive, except of the Mallet articulated type. However, the completion at the present time of a two-cylinder compound freight locomotive, designed to utilize steam of an unusually high pressure, has once more raised the question as to whether the compound type will again seriously be taken up in this country. There is no disguising the fact that many of the older motive power officers view their former experiences with compound locomotives somewhat as a nightmare, which they are perfectly willing to forget, and consequently will hesitate a long time before trying this type again. After superheating had been demonstrated as a satisfactory means for the prevention of cylinder condensation and its simplicity and economy had become generally recognized, it appeared that the principal reason for compounding had disappeared and, in an effort to reduce maintenance costs, many existing compound locomotives were converted into the simple super-heater type. The combination of compounding and super-heating, however, was never given a real trial in this country. Compounding at that time appeared to be a dead issue. In certain European countries, however, where the costs of fuel were relatively high and the cost of labor less than in the United States, the compound locomotive not only retained its popularity, but many details of its design were further perfected. That it has been and still is an economical transportation unit in some places is apparently undeniable. One of the noticeable tendencies in stationary steam engineering at the present time is

What About the Compound Locomotive?

toward a marked increase in boiler pressures and a serious consideration of pressures and temperatures which a few years ago no one thought of using. That this trend may be felt also in locomotive practice is not an improbability. Just at present the attention of railroad men is directed toward the results being obtained by three-cylinder simple locomotives. If continued service demonstrates that this type is as dependable as anticipated and that maintenance costs are reasonable, it is probable a considerable number of locomotives of this type will be built. With such a development the time may then be ripe for another step forward —the three-cylinder compound locomotive—having a boiler carrying much higher steam pressures than are now employed.

Announcing Names of Speakers

Considerable comment was overheard at the convention hall yesterday morning by those in the audience who did not know the names and the affiliations of the speakers taking part in the discussion of the various reports. It is suggested that when a speaker gets up in the convention hall to take part in the discussion, that either the speaker or the chairman distinctly announce the name, the title and the railroad or company he is associated with. It is also suggested that the speaker go to the front of the auditorium and face his audience so that he may be clearly understood.

Engineers' Electrical Meeting

The Association of Railway Electrical Engineers, which will hold its semi-annual meeting this morning, can now look back on many worth-while achievements as an association and feel hopeful for the future. Those who wish to learn the nature of these activities at present will find nine of the fourteen progress reports to be presented in the June issue of the Railway Electrical Engineer which is available at the *Railway Age* booth on the Million Dollar Pier. An intimate relationship exists between Division V, Mechanical, and the Association of Railway Electrical Engineers which is difficult to describe, but which results in complete agreement on all subjects of importance. No actual relationship exists between the two associations, except for the fact that certain men are members of committees in both associations. It may be said, however, that the Mechanical Division lends the A. R. E. E. the advantages offered by its position and prestige, while the A. R. E. E. acts as specialist or advisor to the larger organization.

Electric Locomotive Exhibits

The electric locomotives exhibited this year afford an unusual opportunity for those attending the convention to become familiar with modern types of widely different design. A Chicago, Milwaukee & St. Paul locomotive may be seen on Mississippi Avenue near the Boardwalk. This locomotive, which has been in service for four years on the Cascade Division, represents the most modern type of gearless passenger locomotive for operation on 3,000-volt direct current power. Two locomotives are being shown by the Pennsylvania Railroad at North Providence Terrace, four blocks west of the Boardwalk. These locomotives are the largest type built by the Pennsylvania. As regards appearance and mechanical design, the two locomotives are practically identical. One has been used for several months in freight service out of Philadelphia, Pa., operating from a 11,000-volt alternating current overhead trolley, while the other will be used in passenger service in the Pennsylvania Terminal in New York, operating from a 650-volt direct current third rail. By changing the gear ratio the passenger locomotive becomes a freight locomotive, and the freight locomotive can similarly be made suitable for passenger service. By changing the control apparatus the direct current locomotive can be used on alternating current power and conversely. The motors on both types are identical. These locomotives, known as the L-5 type, are described elsewhere in this issue. This article will provide the reader with a working knowledge of the locomotives and may assist in making an inspection trip more satisfactory. The electric locomotive is a reality, but its principles and characteristics are not well understood by railroad men in general. Heavy electric traction is fulfilling a requirement in modern railroad operation which cannot well be met in any other way, and all who have to cope with the problems of transportation can profit by visiting these exhibits.

Dispelling the Mystery

Friday will be electrical day for Division V—Mechanical. The program includes reports on electric rolling stock and on locomotive and car lighting. In addition to this a paper on the development of the electric locomotive will be presented by F. H. Shepard, director of heavy traction, Westinghouse Electric & Manufacturing Company. Today will also be electrical day for those specifically interested in this phase of railroad work for eight reports on electrical subjects will be presented at the semi-annual convention of the Association of Railway Electrical Engineers to be held at the Hotel Dennis. Care was taken in arranging these programs to avoid conflict so that anyone wishing to do so could take part in the discussion of any or all electrical reports presented to both associations. The significance which may be attached to this electrical display is that the railroad men are losing their timidity in dealing with electrical subjects. For many years all things electrical have been shrouded in a veil of mystery. The electrical men have in the past been guilty of keeping up this superstition, and it has reacted against them, and has undoubtedly retarded the adoption of many things electrical. In the last analysis there is nothing more mysterious about electrical subjects than there is about draft gears or other mechanical devices. The fact that the force known as electricity is not visible should not cause any particular anxiety. The forces in a locomotive side rod are no more apparent. With the growth in the use of electrical apparatus these facts are becoming common property and the result, as indicated by the way electrical reports are handled, will undoubtedly be beneficial to everyone concerned.

Locomotive Utilization Committee Appointed

American railroads have an investment in locomotives variously estimated at between two and three billions of dollars. These locomotives are operated in revenue service less than eight hours a day on an average, a far less intensive use of equipment than could be desired. Evidence continues to accumulate, however, that railroad men appreciate the needs of the situation. The most recent and convincing evidence of the interest of higher railroad officers is in the appointment of a committee on locomotive utilization by the Board of Directors of the American Railway Association on the recommendation of R. H. Aishton, president. The object of this committee, according to the official announcement, is to determine (a) the percentage of time that locomotives should be available to perform actual transportation and (b) the methods for obtaining maximum efficiency while so available. The choice of the members of this committee is significant and a hopeful augury

for the success of its efforts. Both the operating and mechanical departments will be represented, so that a broad-gauge consideration of the subject from both of these angles is assured. The representatives of the Operating Division are A. E. Ruffer, transportation manager, Erie; T. B. Hamilton, general manager, Northwestern Region, Pennsylvania, and J. T. Gillick, general manager, Chicago, Milwaukee & St. Paul. The representatives of the Mechanical Division are F. H. Hardin, chief engineer motive power and rolling stock, New York Central; O. S. Jackson, superintendent motive power and machinery, Union Pacific, and W. H. Fetner, chief mechanical officer, Missouri Pacific. The work of this committee will be followed with the deepest interest by railroad men throughout the country, and the *Railway Age* considers its appointment one of the most important steps yet taken to secure serviceability of locomotives and a greater return to the railroads for their tremendous investment in this equipment.

The Convention Spirit

Back of the convention spirit is an ideal; that is, better railroading. It means hard work for the officers, members of committees, and an extra effort on the part of those who attend the convention. It is at conventions that the railroad man forms associations with other men who are engaged in the same sort of work. He learns what others are doing and has an opportunity to express his own opinions on railroad subjects. For most of the year he is busy on the job and has little opportunity to express his ideas and opinions. The convention gives him an opportunity to unbosom himself and to compare experiences and ideas with his fellows. When the convention is over he will go back home refreshed and invigorated, ready to make the old job hum. Let's get the convention spirit!

Boys' Eye-View of Apprenticeship

The past year has been characterized by a considerable extension of modern apprenticeship methods in the mechanical department of the railroads. Doubtless this was inspired to a great extent by the results which have been evident from the extended experience with modern apprenticeship methods on the Santa Fe. This was clearly developed in the address by Mr. Purcell at last year's meeting; incidentally this address marked one of the high points of that meeting. Undoubtedly one of the reasons for the success of the apprenticeship methods on the Santa Fe has been the fact that both Mr. Purcell and Frank Thomas have not only taken a keen interest in the welfare of the boys, but have studied the situation as far as possible from the boys' point of view. Education has made remarkable progress in this country in recent years because of the scientific effort on the part of educators to study the reactions of the students to their educational methods and practices. that the boys have very pronounced views on this question of training was clearly indicated by the competition which was held during the past year by the Railway Mechanical Engineer, in which the boys very frankly expressed themselves as to what they considered to be the shortcomings of the methods on their various roads. Undoubtedly many railroad officers were rather surprised at some of the statements which were made by the boys. At the same time these comments were usually accompanied by constructive suggestions as to how conditions might be improved. Ought not railroad mechanical officers to adopt the methods of successful educators and allow the boys to help improve the methods by getting close to them and securing frank reactions as to how they view the apprentice training methods?

New York Railroad Club Outing

THE "FROLIC OF 1924" is the same which "Dave" Pye, chairman of the Invitation and Publicity Committee of the New York Railroad Club and in more prosaic affairs, vice-president of the Tuco Products Corporation, has found to be the only one which will fit the July 10 outing of the New York Railroad Club. This affair is going to be a real sports outing and will be held at the Travers Island Club House of the New York Athletic Club. A special train has been arranged for on the New York, New Haven & Hartford both going and return. Music will be furnished by the President's Band of the Erie Railroad. The sporting events will consist of golf, tennis, water sports, handball, balloon race and a baseball game between two fast teams, followed in the evening by a series of three-round boxing bouts.

The Departed Members

THE names of twenty-two members of the Mechanical Division, who have been taken from the ranks by death, were recorded in the report of the General Committee, which was read yesterday morning. The list contains several widely-known men who have been leaders in the affairs of the division and those of its predecessors, the Master Car Builders' and American Railway Master Mechanics' Associations.

W. J. Bohan, who died on October 28, 1923, was an active member of the association whose work was principally with the standing Committees on Brake Shoe and Brake Beam Equipment and Mechanical Stokers. He was one of the pioneer experimenters in car lighting and in this connection first conceived the idea of the head end axle system for car lighting.

H. Wanamaker, who died on March 23, 1924, had long been an active member of the association and served on the Standing Committee on Autogenous and Electric Welding. His progressive ideas on the processes of welding have largely contributed to its present-day perfection.

P, H. Dudley, who died on February 26, 1924, was perhaps better known for his work on rail and other steel products than for his activities in the Mechanical Division. His research in connection with car wheels, however, has been a real contribution to the work of the Committee on Car Wheels.

The following is the list of obituaries reported:

Name	Title and Railroad	Died
Acker, J. J.	G. F. C. D., C. R. I. & P.	Dec. 25, 1922
Bean, S. L.	Atchison, Topeka & Santa Fe	Mar. 24, 1918
Beason, W. R.	M. C. B., Jackson & Eastern	———
Below, Herman F.	Manistee, Mich.	———1922
Berg, J. A.	M. M., Copper Range	Jan. 27, 1924
Bohan, W. J.	A. M. S., Northern Pacific	Oct. 28, 1923
Boughton, W. M.	Detroit, Mich.	Mar. 1922
Brogden, J. E.	S. M. P., Atlantic Coast Line	Oct. 1923
Burk, C. H.	Loco. Supt., Compania del Ferr. Mex.	July 19, 1923
Carnes, J. W.	M. C. B., Georgia & Florida	———
Cole, F. J.	C. C. E., American Locomotive Co.	Jan. 11, 1923
Corinth, A. B.	G. C. I., Atlantic Coast Line	Aug. 21, 1923
Deyat, Frank	G. S. S., New York Central	Dec. 1921
Doyle, John	Denison, Texas	———1920
Dudley, P. H.	Consulting Engr., New York Central	Feb. 26, 1924
French, G. W.	M. M., Missouri Pacific	July 20, 1922
Gibb, Norman	Johannesburg, S. A.	———
Green, J. H.	A. M. M., Canadian National	July 6, 1922
Hendricks, L. W.	Mech. Supt., Bangor & Aroostook	July 12, 1923
Kyle, C.	M. M., Canadian Pacific Ry.	Apr. 22, 1923
Setchel, J. H.	Cuba, N. Y.	Dec. 13, 1923
Wanamaker, H.	D. S. M. P., New York Central	Mar. 23, 1924

Railway Club Secretaries Meet Today

AS ANNOUNCED in yesterday morning's *Daily*, the Society of Railway Club Secretaries will hold its meeting at the Marlborough-Blenheim Hotel, beginning at 10.00 a. m.

Yesterday's Entertainment

THE ENTERTAINMENT features of Wednesday's program consisted of an orchestral concert in the entrance hall of the pier at 10.30 a. m., a concert and informal dancing at 3.30 p. m., and tea was served at 4.30 p. m., in the entrance hall. In the evening at 9.00 p. m., informal dancing with special features interspersed was provided for in the ballroom under the direction of a sub-committee consisting of L. J. McCombs, chairman, assisted by Messrs. W. A. Hicks, Webb G. Krauser, H. A. Pastre, Lewis B. Rhodes, H. A. Yarney, George E. Watts and J. R. Weatherald.

Special Trains Homeward Bound

THE PENNSYLVANIA RAILROAD has arranged for two special trains for the homeward trip. One will leave Atlantic City for New York, Wednesday, June 18, at 3 p. m. (Eastern standard time) and the other for Chicago at 3:50 p. m. (Eastern standard time) on the same day.

The New Life Members

THE REPORT of the General Committee, which was read yesterday, contained a list of thirty new life members who have been added to the list of the Mechanical Division since the last annual meeting held in 1922. These men automatically became life members under the rules of order of the section because of a membership in the Mechanical Division, or one of its predecessors, of twenty years or over. The list is as follows:

Date joined	Name	Title and railroad
1904	Beaumont, H. A.	G. C. F., Baltimore & Ohio
1904	Coutant, M. R.	M. M., Ulster & Delaware
1904	Cromwell, Asst. to C. M. P. & E., Baltimore & Ohio	
1904	Dunham, W. E.	S. C. D., Chicago & Northwestern
1898	Ettinger, R. L.	C. M. E., Southern
1900	Ewing, J. J.	Engr. Tests, Chesapeake & Ohio
1904	Fetner, W. H.	C. M. O., Missouri Pacific
1904	Fries, A. J.	D. S. M. P., New York Central
1900	Davis, W. P.	M. M., New York Central
1902	Gemlo, Wm.	Minneapolis, Minn.
1900	Goodrich, Max	M. M., New York Central
1904	Gould, J. R.	Asst. to C. M. O., Chesapeake & Ohio
1891	McDonough, Jas.	M. M., A. T. & S. F.
1904	McFeatters, F. R.	Gen. Supt., Union R. R.
1895	Mahl, F. W.	Dir. of Pur., Southern Pacific
1904	Malthaner, W.	S. M. P., Baltimore & Ohio
1904	Milton, J. H.	G. F. C. D., C. R. I. & P.
1904	Mitchell, W. A.	S. C. D., Missouri-Kansas-Texas
1903	Ott, Wm. B.	M. M., Pennsylvania
1903	Paul, W. M.	M. M., Texas Midland
1902	Ramsdell, T. M.	M. C. B., Ore.-Wash. R. R. & Nav. Co.
1904	Reeves, P. H.	Gen. Foreman, Baltimore & Ohio
1904	Sheahan, J. F.	Mech. Engr., Atlanta, Birmingham & Atlantic
1903	Smith, C. B.	Mech. Engr., Boston & Maine
1904	Smith, E. J.	M. M., Atlantic Coast Line
1901	Sullivan, J. J.	Supt. Machy., N. C. & St. L.
1904	Tatum, J. J.	S. C. D., Baltimore & Ohio
1904	Terrell, C. H.	A. S. M. P., Chesapeake & Ohio
1904	Thomas, F. H.	Pres., Bellefonte Central
1902	Watson, S.	D. S. M. P., New York Central

Lost and Found

BADGES 6147 and 5978 have been lost somewhere on the pier. The finders of the badges will kindly return them to the Enrollment Booth, which is located at the main entrance to the pier.

A Tribute to T. H. Goodnow

DURING THE opening exercises of the Mechanical Division convention yesterday the division paid a splendid tribute to its ex- vice-chairman, T. H. Goodnow, who left railroad service during the year to become general manager of the Ryan Car Company, Chicago. Chairman Purcell called on F. W. Brazier (N. Y. C.), who took the platform.

MR. BRAZIER: I want first to express my own feelings regarding this man. He has risen from the ranks and has held many important positions in his day. He has been a success—has set a fine example to the rising generation to follow. His loyalty, his devotion to duty and willingness to do a little more than he was paid for has been the reason his services are in demand. He is a graduate of this association and we are proud of him.

I offer the following resolution on behalf of the General Committee:

RESOLVED, That the members of the Mechanical Division, American Railway Association, assembled in Convention in June, 1924, take this occasion to express their appreciation to T. H. Goodnow, for the long and faithful service rendered this association as an active member and officer, and that this expression of appreciation be formally conveyed to Mr. Goodnow with best wishes for his future success and happiness.

Mr. Goodnow, we present this to you (handing him the engrossed resolutions).

MR. GOODNOW: Without any warning as to what to be prepared for except formal notice from those in authority to be here this morning, I am afraid that I find myself in the position of not being able adequately to express what this means to me. One of my greatest regrets in leaving the railroad world was that I was not able to continue through the following year with the hope that the Association would continue to honor me as they have in the past and that I might have sat in the Chair the ensuing year. If I had behaved myself I believe the Association would have put me there, at least I am going to continue to think so.

I want to emphasize Mr. Brazier's remarks that as a young man I undertook to do my share in the old Master Car Builders' Association and continued in its consolidation with the American Railway Association. To those who are starting in at the present time I want to say that I believe it was one of the greatest helps to me regardless of the time and work that it took, in qualifying me for the position which I have filled.

It is quite a change after 35 years in the railroad world to take the step that I have, and I hope at least in a measure to share the success in leaving the railroad world that I had in it. While I can no longer be active in the affairs of the association, nevertheless my interests will always be with you. After thirty-five years I can not forget it.

Mr. Chairman, you selected the right man to deliver this message, as I have every respect for Mr. Brazier. He has always called me his boy. I wish you all success. (Applause.)

The resolution was adopted by a rising vote.

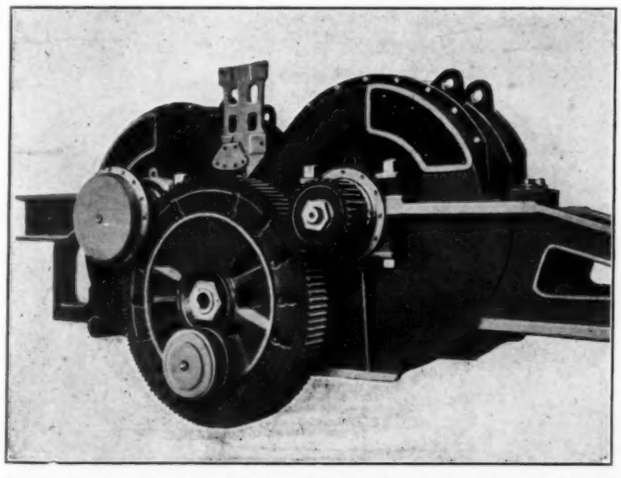
The Pennsylvania L-5 Type Electric Locomotive

Pennsylvania Exhibits New Electric Locomotive

Many Interesting and Unusual Mechanical Features are Included in Its Design

By W. H. Eunson
Railway Equipment Engineer, Westinghouse Electric & Mfg. Co.

In 1923 the Pennsylvania Railroad completed designs for new single-phase electric locomotives for use in either freight or passenger service on 11,000 volts, 25 cycles, alternating current. These same designs also covered a modification of the control equipment to permit the operation of the locomotives in passenger service on 650 volts direct current. The mechanical parts were designed and built by the Pennsylvania Railroad, the electrical parts by the Westinghouse Electric & Manufacturing Company and the locomotives were assembled at the Juniata shop of the railroad company.



Two of the Driving Motors in Cradle With Flexible Gear and Jack Shaft

The first locomotive, known as the L-5, was placed in freight pusher service in February of this year, on the 11,000-volt alternating current section between Overbrook and Paoli, Pa. A second, equipped for passenger service at 650 volts direct current, and known as the L-5-A has just been completed.

The principal dimensions and weights of these locomotives is shown in Table I.

TABLE I

PRINCIPAL WEIGHTS AND DIMENSIONS OF A. C. LOCOMOTIVE

Length, between pulling faces of coupler knuckles	68 ft. 2½	in.
Total wheelbase	54 ft. 11	in.
Rigid wheelbase	22 ft. 3	in.
Height over pantagraph in locked down position	15 ft. 6	in.
Width overall	10 ft. 1	in.
Length of cab	26 ft. 0	in.
Length of hood	16 ft. 9¾	in.
Diameter of driving wheels	80	in.
Diameter of guiding wheels	33	in.
Weight, total	408,600	lbs.
Weight on drivers	308,600	lbs.
Weight on guiding wheels	100,000	lbs.

The locomotives are of the side rod type. Each locomotive is equipped with four Westinghouse type 418 single-phase commutator motors. Two of these motors are geared to a jackshaft, which is connected to two pairs of drivers through the side rods. The two centre drivers are flangeless.

The frame is composed of four main steel castings accurately machined and substantially bolted together to form a continuous framework extending the full length of the locomotive. Each end of this frame is formed into a cradle containing the jackshaft and motors, suitable bearing seats for both motors and jackshaft being provided in the frame.

Lubrication of motor and jackshaft bearings is obtained by an oil circulation system. Under each jackshaft, cast integrally in the main frame, is an oil reservoir holding an adequate supply of oil. Geared to the jackshaft is a plunger type pump which, when the locomotive is running, pumps the oil from the reservoir to a distributing mainfold. From this point, the oil flows under low pressure to each motor and jackshaft bearing, and from thence back to the reser-

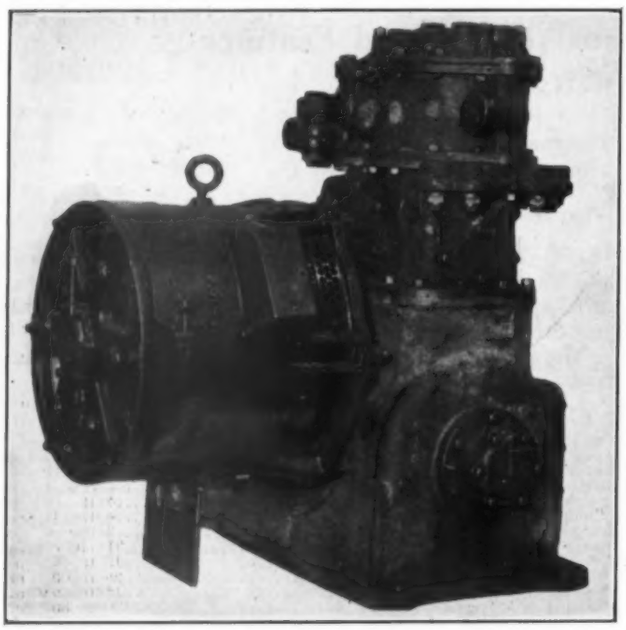
voir. An indicator, consisting of a sight feed valve is located in each operating cab.

The part of the frame extending over the driving axles is carried up to form a support for the equipment deck, the heavier pieces of equipment being bolted directly to the frame. This relieves the cab structure of equipment weight and permits the cab to be placed in position after the heavy equipment work is done.

The guiding trucks on each end of the locomotive are of the radial center-bearing type equalized with the main drivers through bell cranks and tension rods. Flexibility is obtained between the truck and bearing plate by means of flat leaf springs placed transversely and resting in the swing links supporting the weight on the truck.

Each jackshaft is equipped with two sets of flexible gears, one set on each end of the shaft. A set of gears consists of a cast steel gear center carrying the side rod pin, two heat-treated gear rims and a number of flat spring flexible units interposed between the gear rims and the center.

The motors each carry two pinions meshing with the gears, the pinions on the motors nearest the center of the



The Motor-Driven Air Compressor

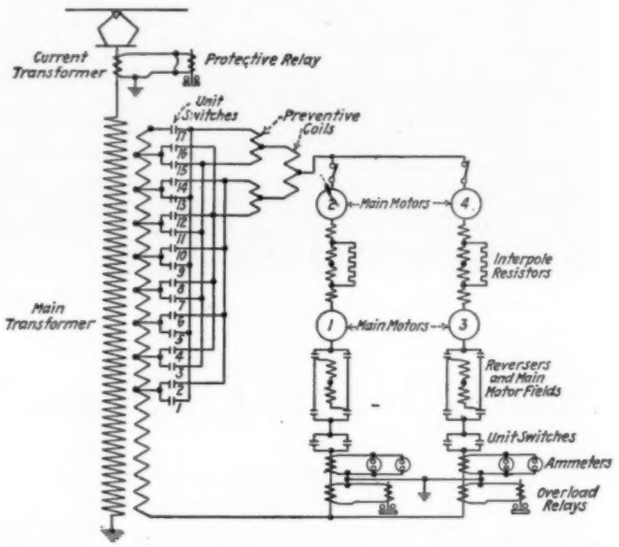
locomotive being solid and those on the outer motors being flexible. The flexible pinions are similar in construction to the gears, using duplicate flexible elements. This arrangement eliminates high local stresses between pinions and gear rims due to light irregularities from machining or heat treatment.

The A-C Locomotive

The traction motors are of the interpole type and the excitation of the interpole fields is adjusted by suitable resistance shunted across the interpole winding. Force ventilation is furnished by a fan which draws air through the motor windings and blows it through and around the interpole resistance grids. A fan is furnished for each motor. The fans are driven by a small alternating current series motor, known as type XB-52.

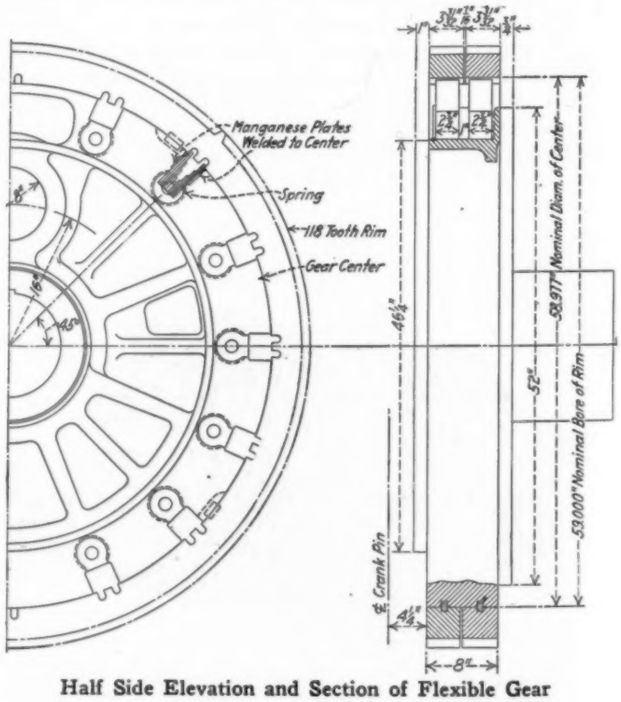
The brushholders of the type 418 motors, together with their interconnections, are mounted on a separate rocker ring which can be rotated completely around to permit inspecting brushholders or replacing brushes from openings at the top of the motors. The testing of these motors is carried out by mounting each pair in a section of the locomotive frame which forms the motor cradle, with the jackshaft, gears and lubricating pump in position.

The main transformer is oil insulated and cooled by circulating the oil through a radiator arranged for forced ven-



Main Circuit Diagram for the Alternating Current Locomotive

tilation. The transformer tank is made from ⅜ in. and ½ in. boiler plate flanged and hydraulically riveted. It is bolted directly to the locomotive frame so that the weight of the transformer and tank is not carried by either the



Half Side Elevation and Section of Flexible Gear

equipment deck or cab structure. Special transformer oil having a low congealing temperature is used.

The switches for transferring the motors between transformer taps are of the electro-pneumatic type having a continuous capacity of 1500 amperes. Main and arcing contacts are of the butt type and are easily replaceable. The arcing contacts and blowout coils are shunted out of circuit when the main contacts are closed.

A reverser is supplied for each pair of motors and is located in the extreme end of the locomotive under the hood, and as near the motors as practical. The contacts are of the laminated brush type. The operation of the reservers is controlled electro-pneumatically.

The air brake equipment is the type 14 E. L., an adaptation of the type 6 E. T. to electric locomotives. Compressed air is furnished by a single compressor having a capacity of 150 cubic feet of free air per minute when operating against a pressure of 140 lb. per square inch. The compressor is driven by a Westinghouse series alternating current motor, type CC-72-C.

Energy for control and lights is obtained from a storage battery with a normal voltage of 30. The battery is charged from a small motor generator set consisting of alternating current single phase motor and a direct current generator.

Control of the operation of the locomotive is obtained through a master controller located in each operating compartment. These controllers are of conventional design.

The changes necessary in the locomotives to make them suitable for either freight or passenger service are entirely in the gearing, the gear ratio for the freight locomotive being 118:30 and the passenger locomotives 98:50. Small hydraulic tools have been designed suitable for either removing or pressing on both pinions and gears, so that this operation can be carried out in any shop where facilities for handling these locomotives will be available.

The D-C Locomotives

The direct current locomotives are designed to use the same main and auxiliary motors as are used with the alternating current locomotive.

The changes in equipment involve the omission of the main transformer, preventive coils, unit switches, pantagraph, master controllers and some details from the alternating current equipment and the application of accelerating grid resistors, 3,000-ampere 650-volt electro-pneumatic switches, thirdrail shoes, master controllers which are duplicates of those on locomotives now operating in the New York terminal and tunnell zone, and some small lighting and protective details.

The 3,000 ampere, 650-volt electro-pneumatic unit switches, are of the laminated brush contact type and there are 23 in each locomotive.

The ratings of the L-5 locomotive geared for both passenger and freight service are shown in Table H.

TABLE II

THE L-5 GEARED FOR A. C. FREIGHT SERVICE

	Amp. per Motor	B. H. P.	T. E. (lb.)	M. P. H.
Max. T. E.	4250	3450	100,000	12.5
One hour	2600	3300	59,000	21
Cont.	2300	3070	50,000	23

THE L-5 GEARED FOR A. C. PASSENGER SERVICE

	Amp. per Motor	B. H. P.	T. E. (lb.)	M. P. H.
Max. T. E.	4250	3450	54,000	22
One hour	2600	3300	29,500	42
Cont.	2300	3070	25,000	46

Pullman Refund for Railroad Men

DURING yesterday morning's session of the Mechanical Division meeting, Chairman Purcell made the following announcement which will be of interest to all railroad men in attendance:

"The members entitled by law to receive free transportation or reduced rate transportation can obtain a half rate refund from the Pullman Company for Pullman fares paid attending this meeting by turning in the receipts for the fares paid with a blank which was mailed out. Any who failed to get the blanks can secure them during the Convention."

Today's Program

THE MEETING of Division V, Mechanical, American Railway Association, will be held in the Greek Temple on the Million Dollar Pier. It will be called to order promptly at 9:30 a. m. The program for the day follows:

Address by R. H. Aishton, President, American Railway Association.
Discussion of reports on:
Shop and Engine Terminals.
Individual Paper, "The Modern Locomotive," by W. H. Winterrowd, assistant to President, Lima Locomotive Works.
Individual paper. "Lehigh Valley Three-Cylinder Locomotive No. 5000," by J. G. Blunt, mechanical engineer, American Locomotive Company.
Individual paper, "Stresses in Track produced by Modern Locomotives," by C. T. Ripley, chief mechanical engineer, Atchison, Topeka & Santa Fe.

ENTERTAINMENT

10:30 a.m.—Orchestral Concert, Entrance Hall, Million Dollar Pier.
3:30 p.m.—Orchestral Concert, and Impromptu Dancing, Entrance Hall, Million Dollar Pier.
4:30 p.m.—Tea will be served in Entrance Hall.
9:30 p.m.—Grand Ball, Ball Room, Million Dollar Pier.

President Aishton will Address Convention This Morning

PRESIDENT R. H. AISHTON, of the American Railway Association, was scheduled to address Division V yesterday morning. Unfortunately the train which was bringing him to Atlantic City was badly delayed and he did not reach here until last evening. His address is scheduled for the first place on the program this morning at 9:30 a. m.

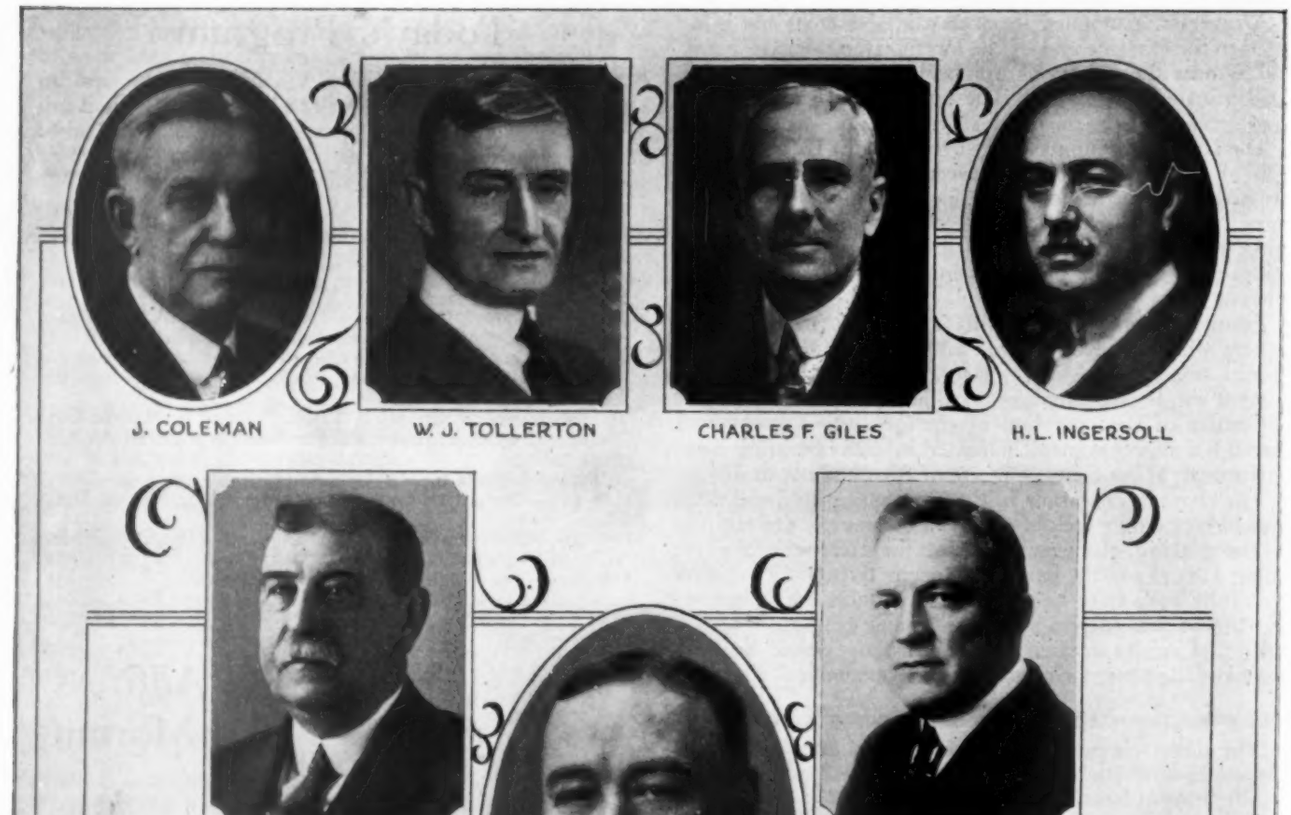
W. R. Scott Detained

W. R. SCOTT, president of the Southern Pacific Lines, had expected to attend the meeting at Atlantic City and address the Mechanical Division. Word was received yesterday afternoon that he had been detained and would not be able to get east in time for the meeting.

Guests of the Mechanical Division

IT HAS always been the custom for the Mechanical Division to extend the privileges of the floor to representatives of the minor mechanical and allied organizations. President Purcell announced yesterday morning that these privileges had been extended to the following associations:

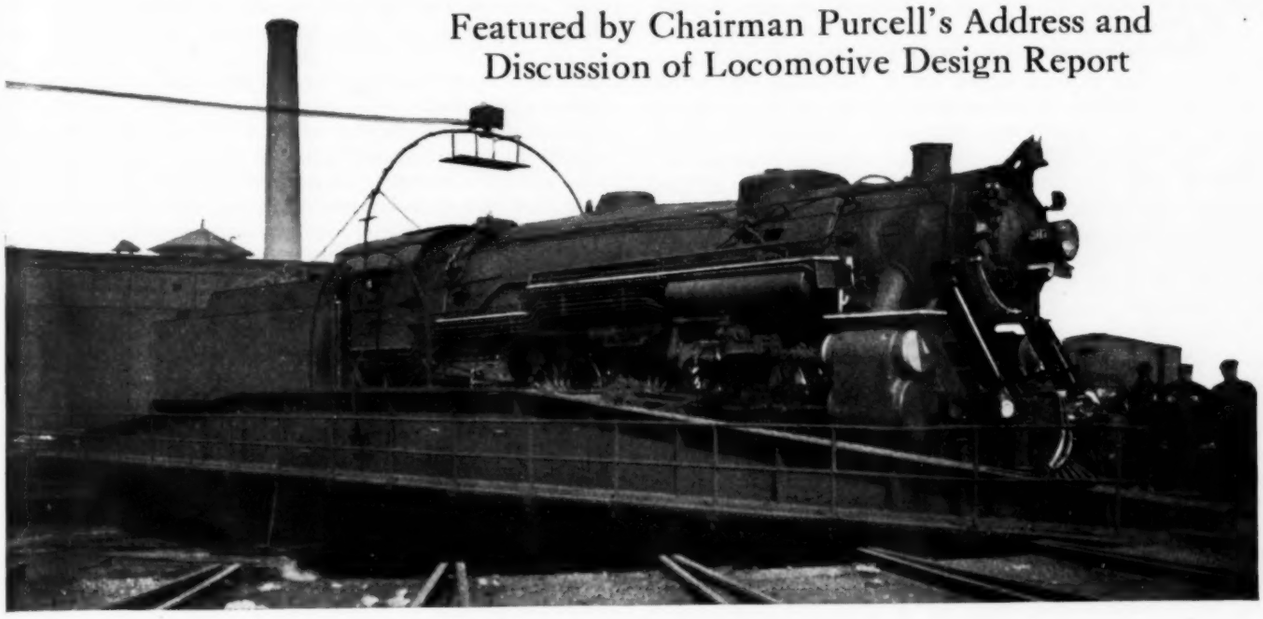
Air Brake Association, American Electric Railway Association, American Wood Preservers' Association, American Railway Tool Foreman's Association, Association of Railway Electrical Engineers, Chief Interchange Car Inspectors and Car Foreman's Association, International Railway Fuel Association, International Railway General Foreman's Association, International Railroad Master Blacksmiths' Association, Railway Accounting Officers' Association, Master Boiler Makers' Association, Traveling Engineering Association, and the various divisions and sections of the American Railway Association.



Officers and Members of the General Committee of Division V—Mechanical—American Railway Association

American Railway Association—Division V

Featured by Chairman Purcell's Address and Discussion of Locomotive Design Report



THE FIFTH annual meeting of the American Railway Association—Division V, Mechanical, opened in the Greek Temple on the Million Dollar Pier at Atlantic City, N. J., at 9:30 yesterday morning. The meeting was called to order by John Purcell, chairman of the Division and assistant to the vice-president of the Atchison, Topeka & Santa Fe.

Dr. George W. Dean, pastor of the Methodist Church in Atlantic City, made the invocation. This was followed by the annual address of Chairman Purcell.

Constructive Suggestions From Chairman Purcell

The 1923 meeting of the Mechanical Division was strictly a business meeting, without any social features or exhibits. It was a highly successful meeting from a business viewpoint in spite of the many local difficulties involved. It was decided, however, that this year's meeting should include exhibits, in order that the manufacturers might have an opportunity to demonstrate the improvements which they have made during the past two years. It appears that this practice of alternate business meetings and meetings with exhibits is a desirable one. There are not enough developments in one year to warrant the expense of exhibits each year.

The year 1923 was a period of rehabilitation, and intensive efforts were made by all the railroads to put all of their power and rolling stock in first class condition. As a result of these efforts, the railroads handled the largest volume of business in their history, in the most efficient and satisfactory manner. The bulk of this problem fell on the officials of the Mechanical Departments. They should be congratulated upon the showing which they made, though, of course, the Operating Departments played an important part in this achievement. The problem has now changed somewhat, business being considerably lighter. We are, therefore, passing into a period of limited retrenchment, though this retrenchment should not be carried to a degree that will result in impaired service to the public. Public sentiment towards the railroads has improved greatly during recent years and last year's efficient service helped strengthen this favorable sentiment. It would be disastrous if the condition of equipment is allowed to fall off to such an extent as to again arouse the animosity of shippers.

Standard Box Car Outstanding Achievement

The outstanding achievement of the Association during the past year has been the adoption of standard box cars. This problem has been worked on by various committees for a number of years, but this is the first time that a standard car has passed a vote of the Division. The Car Construction Committee is to be congratulated on the good work they have accomplished during the past year. We are now well on the way toward the building of standard box cars by the American railroads. This is an achievement of which the Mechanical Division may well be proud, though we should be on the lookout for ways of improving the design and of taking advantage of new developments which may arise, for standardization should never be carried to a degree that blocks advancement.

The various committees have been very active during the past year; many of the members have devoted a large part of their valuable time to this work. I wish to pay special tribute to the work which has been done by the Arbitration and Price Committees. These committees have had to bear a heavier burden each year and their work lies at the root of the success of the Mechanical Division. Their judicious and fair-minded decisions have won general approval and have indicated the careful study and thought they are giving to all of the problems presented to them. I wish also to give credit to the Air

Brake and Safety Appliance Committees for the large amount of work which they have handled during the past year. They have rendered the railroads valuable service.

Committee Reports Show Intensive Effort

The various reports which are to be presented at this meeting by the other committees also indicate the efforts which they have put forth. Many of the committees have been changed during the past two years, in order to include in their make-up only men who are willing to give their active assistance. An effort has also been made to enlist younger men, in order that they may develop in the association work and be thereby fitted for greater responsibilities in later years. We are highly gratified by the interest which has been shown by these younger men in the work, and it is my opinion that we should further this practice, though, of course, the presence on the various committees of older men of more mature judgment is also necessary.

We are fortunate this year in having a paper on electric traction by one prominent in this field of endeavor. It appears that our Association has not taken as active an interest in this subject as it should. Electric traction is sure to play an important part in American railroading in the near future, and it is hoped that the committees of this Association will lay a groundwork which will be helpful to railroads going into this new field, as well as to manufacturers of the equipment.

We are also fortunate this year in having two papers on the development of new types of locomotives. The past year has been a notable one in the interest which has been shown in the improvement of the modern steam locomotive. The types which have been most extensively discussed are the 50 per cent cut-off locomotive, the three cylinder simple locomotive, and the booster-equipped locomotive. All of these types have certain features which warrant careful study by mechanical department officers. The Locomotive Construction Committee should keep in active touch with the work which is being done on these designs and the results which are secured in operating service, for after all, it is not only a locomotive with high thermal efficiency which we desire, but one that is also satisfactory from an operating viewpoint. A locomotive to be satisfactory must be able to get over the road without failures, and with a reasonable maintenance cost. These two factors are often overlooked by proponents of radical changes in design. There are two revolutionary changes in locomotive design, which are engaging the thought of many prominent engineers; these are the turbine locomotive and the diesel locomotive. Our European neighbors have gone further in this work than we, due probably to the higher cost of their fuel. However, it is our belief that in the near future there will be designs of these types made by American engineers to suit the requirements of American railroading, which may revolutionize locomotive construction. It appears that the Diesel engine has reached the stage of perfection where it will in itself be a satisfactory unit of power, without undue weight. The transmission or coupling arrangement is, however, a stumbling block which has held back the development of this type of locomotive. New ideas are, however, now in process of development, which give promise of meeting all the requirements. Here again our Locomotive Construction Committee should follow up the developments and report all points of interest.

Draft Gears Deserve More Attention

In the case of cars, there is one subject which requires more attention than has been given it by the committees, and that is "Draft Gears." This very important part of the car is one that should be given thorough study by the Draft Gear Committee. It is possible that the committee might arrange for competitive tests at some one of the university plants, and also gather data as to the service life of the various makes of gears. Such information would be very valuable to our designers and from a maintenance viewpoint.

Mechanical department officers should give careful thought to providing labor-saving machinery, as the returns on such investments are greater now than at any other time in railroad history. Adequate shops and modern machinery should be installed wherever financial conditions will permit. A new development in connection with financing additional facilities of certain types has been brought forward in the last few years, whereby the manufacturers will arrange for the financing of an installation on a plan somewhat similar to the equipment trust certificate system. This plan may prove of great assistance where a railroad's financial condition is such as not to permit of the immediate necessary expenditures.

In the past few years great interest has been taken in the training of apprentices and supervising officers, and we believe the effort being made by the various railroads is going to result in large returns in the future, though the management must not be too impatient in expecting immediate results, for the training of men requires time. Railway managements cannot afford to neglect the human element. Men, the right kind of men, are more important than machinery or materials, and much more difficult to secure. The development of man-power is more essential than the development of mechanical equipment. Specific plans should be followed to guarantee proper selection, placement, and training of men, both for the rank and file and for supervisory positions. Money rightly spent in the development and maintenance of efficient man-power will be found to be a most profitable investment, rather than an expense. It is unfortunate that more technical men are not attracted into the mechanical departments of the American railroads. Various reasons are ascribed for this, but I believe that the main one is the fact that competitive industries are bidding higher for college graduates than the railroads have been able to do; and I believe that some college graduates are under-estimating the final possibilities of railroad work. It is the nature of young men to want to get immediate returns, rather than ultimate returns. We are fortunate at this convention to have a paper by Mr. Baldwin on the subject of "Training Supervising Officers." I feel sure that this paper will help to arouse further interest in this most vital subject, and its relation to the future of our railroads.

Higher Officers Welcome at Convention

It is a great pleasure to see more and more Railroad Presidents and Officers, other than from the mechanical departments, attending the session of the Mechanical Division and looking over the exhibits which have been provided by railway supply companies. The importance of mechanical departments of railroads, controlling as they do a large percentage of the expenditures (is being realized more and more by railway executives, and their attendance at these meetings is very helpful in bringing to their attention the problems of the mechanical department officers and the importance of the work performed by the mechanical department. We welcome these officers and thank them for being with us. We are particularly grateful to the various officers who have given so much of their valuable time to the preparation of papers on special subjects. It is an inspiration to all of us and to the younger men particularly, to hear these men present their addresses. It is of value to come in contact with

others who have gone further up the ladder, as it is a spur to our ambition to emulate their success.

Younger Men Should Take Part

I want to take this opportunity to urge the younger men in attendance to take an active part in the discussions. Many of them are in active touch with the details of the various subjects which are being discussed and their viewpoint and opinions will be of the greatest value to all of us. We want them to understand that we are more than glad to hear them express their views and we do not wish them to wait to be directly called upon in order to enter into discussion. After all, the future of our Association is in the hands of these younger men and the time is not far off when they will have to take up the work which is now being handled by the elder members. I also urge them to make a careful study of all the exhibits, as it is a liberal education to men in mechanical work to see the remarkable developments and to talk to the representatives of the different manufacturers in charge of the exhibits. Any man taking advantage of this opportunity will secure a fund of knowledge which will be of utmost value to him.

There are a number of other railway associations, which deal largely with railroad mechanical matters. The work of these associations is of great value and our members should keep in close touch with their proceedings. Our committee should see to it that any pertinent subjects which are brought up in meetings of these associations are given consideration in the discussions of the reports to be presented to this Division. The A. R. A. has a legislative power which the other associations do not have. Therefore, anything of value which they bring out should be taken up promptly by our Division, in order to make changes in standards, which will guarantee advantage being taken of same. We welcome the valuable assistance of these associations and assure them that we are all working for the same cause; that is, the advancement of the work of the mechanical department.

In conclusion I wish to extend my sincere thanks to the chairmen of the various committees, to members of the comittees and to our efficient secretary, for the untiring efforts which they have put forth during the past year to promote the work of the Division. I also wish to express the appreciation of the Mechanical Division for the work of the various railway supply companies in preparing for us the wonderful exhibits which are available for our inspection on the pier.

Report of General Committee

Since the last annual meeting, the General Committee has held meetings on the following dates: November 8, 1923, December 7, 1923, January 23, 1924, April 23, 1924, and June 10, 1924.

The membership of the division at the present time includes 219 railways, representing 399 memberships in the American Railway Association, and in addition thereto, 170 railroads, associate members of the American Railway Association.

These railroads have appointed 1,010 representatives in the Mechanical Division. In addition there are 1,247 affiliated members and 142 life members in the division.

The last session of the division was held June 20-22, 1923. Since that time the General Committee has taken action on several important subjects. This action is outlined in the following report and your approval is respectfully requested.

Annual Meeting 1923

On account of the unusual conditions, it was considered best to held a strictly business meeting in 1923 without exhibits of machinery and devices. Your committee, therefore arranged for a three-day business session to be held in Chicago, June 20 to 22, 1923, and provided a program which resulted in great benefit to the member roads. The proceedings of the 1923 annual meeting have been printed and distributed to the members.

Manual of Standard and Recommended Practice

The changes made in the Manual of Standard and Recommended Practice, as result of action taken on recommendations of reports considered at the 1923 annual meeting and approved by formal letter ballot, have been taken care of by issuing revised loose-leaf pages to be inserted in the Manual.

Interchange Rules

The recommendations of the Arbitration Committee and the Committee on Prices for Labor and Materials, approved at the 1923 Annual Meeting, were incorporated in the Rules of Interchange for 1923, effective January 1, 1924.

Loading Rules

The recommendations from the Committee on Loading Rules, considered at the annual meeting for 1923 and approved by letter ballot of the members, were incorporated in a supplement to the Loading Rules issued effective January 1, 1924.

Tank Car Specifications

The recommendations from the Committee on Tank Cars, considered at the Annual Meeting for 1923 and approved by Letter Ballot of the members, were incorporated in a Supplement to the Tank Car Specifications issued effective January 1, 1924.

Mechanical Inspection Department

The Mechanical Inspection Department of the division has, throughout the year, continued its investigation covering repairs to foreign cars and billing therefor on a considerable number of railroads. Reports of these investigations have been made quarterly to the board of directors of the American Railway Association. Since January 1, 1924, where definite overcharges have developed as result of these investigations counterbilling authority has been issued to the car owners, in accordance with the billing regulations approved at the annual meeting last year.

Maximum Load Markings for Freight Cars in Lieu of Nominal Capacity

Upon recommendation from the Committee on Car Construction, your committee has approved increasing the allowable load limits of the "B" and "C" axles; 2,000 lb. in case of the "B" axle and 1,000 lb. in case of the "C" axle.

In accordance with this action Column "A" of the table in Rule 86, covering 60M and 80M capacity cars, has been increased to show a total weight on rail for the 60M capacity car of 103,000 lb. and the 80M capacity car of 136,000 lb.

It has also been decided to recommend that load limit marking be added to the present capacity markings on freight cars. This to be in addition to the nominal capacity and tare weight markings shown on cars at present. This matter has been referred to the Committee on Car Construction, which committee will make recommendations as to location and manner of marking.

Joint Inspection of Standard Material

The Joint Committee of Purchases and Stores Division and Mechanical Division made a report on the subject of joint inspection of standard materials. This report was sent to the voting members in the Mechanical Division for approval or disapproval. The majority of the members disapproved.

Investigation of Power Brakes and Power Brake Systems

The Committee on Safety Appliances, assisted by Committee on Brakes and Brake Equipment, has been handling matters for the Association in connection with the investigation of power brakes and power brake systems before the Interstate Commerce Commission.

Extension of Effective Dates of Rules and Regulations

As occasion has arisen during the year your committee has, upon recommendation from proper committee of the division, extended

the effective dates of certain provisions of the Rules and Regulations of the division. These extensions have been covered by circular issued to the members.

Settlement with Private Car Owners Who Refuse to Accept Interchange Rules

On account of the refusal of certain small private car owners to accept the Interchange Rules as basis of settlement for cars repaired and destroyed about two years ago proposition was advanced to make the payment of mileage contingent upon payment of repair bills rendered under the Interchange Rules. On account of the fact that the American Petroleum Institute and other Associations of private car owners have been successful in bringing most of their members into the Interchange Rules Agreement, it was decided that this matter should be dropped from the docket.

Standard Box Cars

The recommendations for designs for standard box cars and trucks, presented by the Committee on Car Construction at the 1923 annual meeting, were submitted to letter ballot in circular No. D. V. 316, September 15, 1923. The propositions failed to receive the necessary two-thirds majority for adoption, although receiving a majority of the votes cast. A meeting was held of representatives of those roads voting against the propositions and a new form of letter ballot submitted in Circular No. D. V. 316A, December 19, 1923. This letter ballot took care of most of the objections to the Ballot first submitted.

The designs submitted to letter ballot consisted of single sheathed box cars having steel underframe and steel superstructure frame with wood sheathing; and double sheathed box cars of all steel construction including steel sheathing. Designs cover cars of 40-tons capacity and single sheathed cars of both 40-and 50-tons capacity.

The final vote by letter ballot was as follows, and was on the basis of one vote for each 1,000 cars owned by the members:

Proposition No. 5—Single sheathed box cars: For, 2,422; against, 202. Affirmative vote 92.3 per cent. of votes cast.

Proposition No. 6—Double sheathed box cars: For, 1,916; against, 528. Affirmative vote 78 per cent. of votes cast.

Proposition No. 7—Truck, Type W, with separate journal boxes: For, 1,759; against, 791. Affirmative vote 68.9 per cent. of votes cast.

Proposition No. 8—Truck, Type Y, having journal boxes cast integral: For, 2.071; against, 553. Affirmative vote 78.9 per cent. of votes cast.

There are 399 memberships in the association represented in the Mechanical Division. Cars represented, 2,759,206. The rules of order of the Mechanical Division require a two-thirds vote for adoption of propositions submitted to letter ballot, the voting representatives of the company to be appointed by the representatives of the members in the American Railway Association. Each of the above propositions received more than the two-thirds majority required for adoption.

The inside width for both types of cars as voted upon is 8 ft. 6 in. Three members of the General Committee objected to the inside width being restricted for the double sheathed car which may be approximately three inches wider than the single sheathed car because the thickness of the side truss of an all steel car is less than that of a single sheathed car using wood sheathing. The General Committee referred this matter to the Board of Directors at a meeting in Chicago, May 15, 1924, including report of the minority recommending an inside width of 8 ft. 9⅛ in. for the double sheathed car. The subject was referred back to the Mechanical Division by the Board of Directors with request that there be prepared a statement of the fundamentals involved in the matter of the inside dimension of box cars; the statement to be prepared solely from the standpoint of standardization and laying aside the question of any traffic influences which any inside dimension might incur.

Settlement for Rebuilt Cars

A special committee of the division has been considering this subject throughout the year. This committee was unable to agree in a unanimous report and the matter has been referred to the board of directors of the American Railway Association, together with reports from both sections of the committee.

Joint Committee on Utilization of Locomotives

The following representatives have been appointed to represent the Mechanical Division on a joint committee of the Operating and Mechanical Divisions studying the subject of utilization of locomotives: A. R. Ayers, assistant general manager, New York, Chicago & St. Louis; W. H. Fetner, chief mechanical officer, Missouri Pacific; W. H. Flynn, superintendent motive power, Michigan Central.

Modernizing Locomotive Equipment

At the request of the Board of Directors, a questionnaire was sent to the members covering the modernization of locomotive equipment. The replies to this questionnaire have been tabulated and submitted to the president of the Association.

Damage to Equipment Through Misuse by Shippers or Consignees

Circular No. D. V. 320, on the above subject, has been prepared and sent to the members and has to date received a distribution of approximately 50,000 copies to railroad agents and shippers.

Ratio for Equating Coal and Oil in Consumption and Conservation Comparisons

Your committee has approved the report submitted by the Joint Committee on Fuel Conservation, on the above subject, attached hereto. It is recommended that this matter be referred to the members by letter ballot in the usual form for adoption as standard of the Division.* The Joint Committee on Fuel Conservation has also been requested to give consideration to establishing a ratio for kilowatt hours of electrically operated roads with coal.

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* This subject was referred by the A. R. A. Joint Committee on Fuel Conservation to the International Railway Fuel Association's Committee on Co-operation with the American Railway Association, of which Eugene McAuliffe, Union Pacific, is Chairman. After an extensive research and consideration of the several factors involved, the committee submitted the following recommendations:

First.—That 160 gals. of fuel oil, the mean of the several results obtained in the foregoing presentation, be considered as the proper equivalent for one ton (2,000 lb.) of coal.

Second.—That inasmuch as no attempt to equate for the variations in coal thermal values is now made in the compilation of fuel statistics, the basis of 160 gals. to one ton be used by all roads, in all classes of service.

Third.—That all fuel statistics, whether for submission to the Interstate Commerce Commission or for local or general comparative purposes, include, in the case of locomotives, all fuel oil used, whether for firing up purposes or in terminal or on-line stand-by losses.

Fourth.—That when it is considered desirable to segregate oil used at terminals or during stand-by periods, same be made a separate computation and report, and be computed on the basis of per cent. relation to all oil used by the locomotive.

Fifth.—That where actual relative values of oil and coal fuels are required, to determine the comparative cost of same, that such be arrived at by actual test of the oil and coal available, test to be made in the service the fuel is to be used in; the relative cost of transportation off and on users rails, cost of handling and other similar factors to be weighed and used in determining results.

Nominating Committee

The General Committee, in accordance with Section 2-A of the Rules of Order, offers the names of the following members as candidates for the Committee on Nominations:

F. W. Brazier, assistant to general superintendent rolling stock, New York Central.

H. T. Bentley, general superintendent motive power and machinery, Chicago & North Western.

J. J. Hennessey, assistant master car builder, Chicago, Milwaukee & St. Paul.

C. E. Chambers, superintendent motive power and equipment, Central Railroad of New Jersey.

W. J. Tollerton, general superintendent motive power, Chicago, Rock Island & Pacific.

J. Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe.

J. S. Lentz, master car builder, Lehigh Valley.

J. Coleman, general superintendent car equipment, Canadian National.

R. W. Bell, general superintendent motive power, Illinois Central.

M. A. Kinney, superintendent motive power, Hocking Valley.

This report is signed by J. Purcell (chairman), assistant to vice-president, Atchison, Topeka & Santa Fe; J. J. Tatum (acting vice-chairman), superintendent car department, Baltimore & Ohio; J. S. Lentz, master car builder, Lehigh Valley; H. L. Ingersoll, assistant to president, New York Central; W. J. Tollerton, general superintendent motive power, Chicago, Rock Island & Pacific; J. Coleman, General superintendent car equipment, Canadian National; C. H. Temple, chief motive power & Rolling stock, Cana-

dian Pacific; C. F. Giles, superintendent mochinery, Louisville & Nashville; J. T. Wallis, chief of motive power, Pennsylvania System; A. Kearney, superintendent motive power, Norfolk & Western; C. E. Chambers, superintendent motive power and equipment, Central Railroad of New Jersey, and L. K. Sillcox, general superintendent motive power, Chicago, Milwaukee & St. Paul.

Discussion

H. T. Bentley (C. & N. W.): I move that the report of the General Committee be approved with the recommendation that the equating of oil for fuel be submitted to letter ballot.

The motion was duly seconded and carried.

Report of Committee on Nominations

The terms of office of the chairman, vice-chairman and seven members of the General Committee expire June, 1924.

In accordance with Section 7 (a) of the Rules of Order of the division which provides that officers of the division shall be elected at the regular meeting of the division held in June of each year, your Committee on Nominations nominates the following for the officers of chairman and vice-chairman:

For chairman—Term expiring June, 1925: J. J. Tatum, superintendent car department, Baltimore & Ohio.

For vice-chairman—Term expiring June, 1925: J. T. Wallis, chief of motive power, Pennsylvania.

As the terms of seven members of the General Committee expire in June, 1924, your committee nominates the following to serve until June, 1926, as members of the General Committee: C. F. Giles, superintendent machinery, Louisville & Nashville; A. Kearney, superintendent motive power, Norfolk & Western; L. K. Sillcox, general superintendent motive power, Chicago, Milwaukee & St. Paul; J. Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; C. E. Chambers, superintendent motive power & equipment, Central Railroad of New Jersey; C. H. Temple, chief of motive power and rolling stock, Canadian Pacific, and G. E. Smart, chief of car equipment, Canadian National.

Your committee also nominates J. C. Fritts, master car builder, Delaware, Lackawanna & Western, to fill the unexpired term of J. J. Tatum, who is nominated for the office of chairman and whose term as member of the General Committee expires in June, 1925; O. S. Jackson, superintendent of motive power and machinery, Union Pacific, to fill the unexpired term of C. E. Fuller, who has left railroad service and whose term expires in June, 1925; F. H. Hardin, chief engineer motive power and rolling stock, New York Central, to fill the unexpired term of H. L. Ingersoll, who has resigned and whose term expires in June, 1925; W. H. Fetner, chief mechanical officer, Missouri Pacific, to fill the unexpired term of Willard Kells, who has left railroad service and whose term expires in June, 1925, and A. R. Ayers, assistant general manager, New York, Chicago & St. Louis, to fill the unexpired term of H. C. Oviatt, who has left railroad service and whose term expires in June, 1925.

The report is signed by F. W. Brazier (chairman), assistant to general superintendent rolling stock, New York Central; H. T. Bentley, general superintendent motive power and machinery, Chicago & North Western; J. J. Hennessey, assistant master car builder, Chicago, Milwaukee & St. Paul; C. E. Chambers, superintendent motive power and equipment, Central Railroad of New Jersey, and W. J. Tollerton, general superintendent motive power, Chicago, Rock Island & Pacific.

Discussion

E. Chambers (C. R. R. of N. J.): I move the report be received. The motion was duly seconded and carried.

F. W. Brazier (N. Y. C.): You will note the Nominating Committee reports a number of changes—many new men on the General Committee. As one of the oldest members in the service, and perhaps in years, and having the love I do for the Car Department and Equipment Department, I felt that as long as I am able I want to say something to the younger men, and with your permission I will read a few remarks.

Keeping Our Association Alive and Up-to-Date

We must keep the fire of improvement burning. Experience is what we want; we must not dwell on the past. We want the Association to continue to investigate and study the best methods for improvement, operation and utilization of its cars and locomotives. The Association is like a college which educates its members and fits them for advancement in life. We have reached a state of development, efficiency and accomplishment, where we have shown that this Association is competent to handle the question of standardization of equipment and rules pertaining to its interchange without the need of outside help. There is greater fraternity among the members than ever before, the spirit of compromise and charity of those who differ with us is manifest everywhere and we are all working together as a unit or happy family to bring better conditions in our particular field of endeavor.

F. W. Brazier
Chairman

As we look back at the splendid record made by the Master Car Builders' and Master Mechanics' Associations, in all that pertains to mechanical matters—that is, the adoption of standards, rules of interchange and many other things that are all history and so recorded in our proceedings each year—it is a record to feel proud of.

This Association is the pioneer of all other mechanical associations in the country. Starting over half a century ago, it has blazed the pathway for the adoption of standards of equipment and locomotives and its rules of interchange have helped make the operation of the railroads a success.

During the last few years there has been a change in our conventions, brought about by the attendance of many of our higher officials and their observance of the wonderful display of machinery and other devices used in the construction and operation of cars and locomotives; also by their attendance at our meetings at which they have heard

papers read and discussed on the many different subjects, all of which has resulted in their being convinced of the great benefits derived from our conventions and exhibits.

Attendance At Our Conventions

I might also say that at these conventions we have often had the pleasure of the company of many noted college professors as well as the rank and file of railroad men in this country, Canada and Europe. Since we have become the Mechanical Division of the American Railroad Association some of these officials have met with us each year and have given their hearty approval of the work we are doing.

Our Standing Today

We sometimes hear it said, since we have changed our name to the Mechanical Section of the A. R. that we, as an association, are not as strong as we were a few years ago. Let me say right here—*this is not so*—today we are better and stronger than ever as we now have the backing of our higher officials. All our actions, standards, rules and recommendations are approved by the board of directors of the American Railway Association and therefore become binding, so instead of being wiped out of existence, we, as I have stated before, are better and stronger. There is no other association that can put into practice on the railroads of this country any of their suggestions or recommendations unless they have the approval of the higher officials. This Association is, in a sense, a legislative body, unlike the other associations, and its adoption of rules and standards become binding.

The Future Committee Work

As the saying goes—we must keep the fires of improvement burning. Experience is what we want; we must not dwell on the past. We want the Association to continue to investigate and study the best methods for the improvement, operation and utilization of its cars and locomotives, including electrical equipment, etc.; also to make a study of shop economy, supervision, economics of labor, apprentices, lighting of equipment, etc. The field is wide, and there are so many other subjects that need careful study and attention for our future welfare that I want to now impress on our members the importance of committee work and the great value derived from the study of the different subjects handled.

To the Younger Members

While it is true the Association has made a record in the past, the future is before you. You young men who are coming along to fill the places of the older members, have a splendid chance to make this Association even better than in the past. You are living in an age that demands the best there is in service, rules, equipment, etc.—you have far greater responsibilities than did your predecessors. This Association stands for all that pertains to progress and improvement, and may I urge you, one and all, to take a greater interest in the work of the Association, that is, in committee work, by taking part in the discussions, expressing your views, giving your experiences and, above all, take the stand that this Association is not dying but is a *live wire*.

Broadcasting Our Work

Today we have the radio on which we can reach out, tune in and get information from all over the country; so this Association should be like the radio—broadcasting its work of an educational nature.

We are fortunate in having railroad magazines which publish subject matter pertaining to railroad operation, including the work of this Association, and they, as the saying is, "Broadcast all the up-to-date railroad news."

As an Educational Association

This Association is like a college which educates its members and fits them for advancement in life. For a moment, look at the men who today are holding high positions in the manufacturing world and official positions on the railroads, who started in the mechanical departments of the different railroads of this country. Most of them took a live interest in this work and their voices were often heard on the floor of our conventions. I would like to briefly refer to just a few of these men—A. L. Humphrey, G. Wildin, LeGrande Parish, H. F. Ball, Teddy Godnow, E. D. Bronner of the Michigan Central, W. D. Robb of the Canadian National Rys., and W. W. Atterbury of the Pennsylvania. All are graduates of this Association.

I would again like to refer to the question of apprentices and the importance of encouraging young men to enter our service as such. Many railroads already have the apprentice system and are taking a great interest in it. The apprentice system on the Santa Fe which John Purcell, by his own energy and interest, started some few years ago, has proven a wonderful success. In encouraging young men to become apprentices in order to learn a trade and eventually become mechanical men, we will be getting new blood to take the place of old.

As one of the oldest members, I assure you that as long as I am able, I want to continue my interest in this Association.

The Future

I often wonder if the younger members realize the business importance of these meetings, and the effect of our actions on the great transportation arteries of the country, involving, as they do, the financial and economic life of the nation. John Hennessey, John Lentz and a few others are the remaining landmarks of this Association, the patriarchs, so to speak, who have seen this organization grow from a gathering of railroad mechanical men who met and discussed their various ideas without authority to enforce except by the voluntary consent of each member of the convention. We now have a well organized tribunal with plenary powers to designate the most approved state of the art in car and locomotive construction and railway mechanical practice. We have reached a state of development, efficiency and accomplishment, where we have shown that this Association is competent to handle the question of standardization of equipment and rules pertaining to its interchange without the need of outside help. There is a greater fraternity among our members than ever before, the spirit of compromise and charity of those who differ with us is manifest everywhere, and we are all working together as a unit or happy family to bring about better conditions in our own particular field of endeavor. It is only by viewing the progress of our work from afar, or looking at its accomplishments in retrospective and by comparison with the past, which I am now able to do since relinquishing my activity in the work, that I am most profoundly impressed with the great strides that have taken place and with the efforts that are now crystallizing into actual achievement.

To you members of this Grand Old Mechanical Association may our future be like our past record,—progress and advancement in all that pertains to *safety* and *service*.

Report on Locomotive Design and Construction

The committee's report is divided into two exhibits, the first developing a suitable formula by which the tractive force of a Mallet locomotive may be determined, and the second discussing the comparative merits of hydrostatic and force feed lubrication for locomotive cylinders and steam chests and the best method of application.

The committee found that the formula now in general use for determining tractive force of simple and Mallet locomotives gives only an approximation of the actual tractive force, and developed formulæ suitable for all types of Mallet locomotives. The various formulæ derived are assembled in tabular form.

The committee states that it found difficulty in obtaining data as to the comparative merits of hydrostatic and force feed lubrication. It finally secured the co-operation of 14 railroads who are making tests and compiling data which will not be ready to present until the next convention.

H. T. Bentley

The committee this year has given consideration to the following subjects: Standardization of taps and dies used by railroads; bolt and screw thread standardization; rail stresses under locomotives; standardization of water columns; definition of an engine failure; tractive force for Mallet locomotives; comparative merits of hydrostatic and force feed lubrication for locomotive cylinders and steam chests and best methods of application.

On account of the large amount of work necessary in connection with the report and the importance of the subjects, the reports on all of the subjects have not yet been completed. The subjects of tractive force for Mallet locomotives and comparative merits of hydrostatic and force feed lubrication are reported separately in Exhibits A and B.

Exhibit A—Tractive Power for Mallet Locomotives

The formula now in general use for the simple locomotive gives only an approximation of the actual tractive force of such a locomotive, because simple locomotives vary in maximum cut-off, back pressure, internal friction, etc. For the same reasons, any formula adopted for determining the tractive force of Mallet locomotives will give only an approximation of the actual tractive force. However, the same reasons that justify the adoption of a universal formula for the tractive force of the simple locomotive, also justify the adoption of a universal formula for the tractive force of the Mallet locomotive.

There are two general types of Mallet locomotives, the four-cylinder simple and the four-cylinder compound.

The following symbols apply to all formulæ given:

C = Diameter of high pressure or simple cylinder in in.
c = Diameter of low pressure cylinder in in.
S = Stroke in in.
P = Boiler pressure in lb. per sq. in.
D = Diameter of driving wheels in in.
H = Mean effective pressure of high pressure or simple cylinder in lb. per sq. in.
E = Mean effective pressure of low pressure cylinder in lb. per sq. in.
R = Ratio of cylinder volumes = $\frac{c^2}{C^2}$
M = Constant = .85 for 90 per cent. cut-off locomotives.
= .75 for 50 per cent. cut off locomotives with .75 per cent. cut off auxiliary ports.
Q = PM = Total mean effective pressure in cylinders in lb. per sq. in.
T = Tractive force in lb.

Of the values of M given above, the first has been generally adopted for simple locomotives having approximately 90 per cent cut-off. The second value, that for locomotives having approximately 50 per cent cut-off, is taken from results obtained from the Pennsylvania class Ils (2-10-0) locomotives. In these locomotives, each piston valve bushing has an auxiliary steam port ⅛-in. long by 1½ in. wide and having ¼-in. steam lap. These auxiliary ports or some similar devices are necessary for the successful operation of the 50 per cent cut-off locomotive. The constant .75 is recommended for all locomotives having approximately 50 per cent cut-off and means for supplying auxiliary steam to a cut-off of at least .75 per cent.

The four-cylinder simple Mallet is essentially nothing more than two simple locomotives with but one boiler. Therefore, the tractive force of this type of locomotive is double that of the simple locomotive, or

$$T = \frac{2\,M\,P\,C^2\,S}{D}$$

which becomes— $T = \frac{1.7\,P\,C^2\,S}{D}$ for 90 per cent. maximum cut-off locomotives, and

$T = \frac{1.5\,P\,C^2\,S}{D}$ for 50 per cent. maximum cut-off locomotives.

The four-cylinder compound is usually equipped with a device by means of which the locomotive can be operated as a simple locomotive at certain times. Under this condition the tractive force of the locomotive would be

$$T = \frac{(H\,C^2 + E\,c^2)\,S}{D}$$

In a properly designed compound locomotive, it is the intent that the piston pressures will be equal. If they are not equal, one pair of cylinders will do more work than the other pair which would not be economical. Therefore, we may assume that the mean effective pressures vary inversely as the squares of the cylinder diameters, or

$$\frac{H}{E} = \frac{c^2}{C^2} = R \quad \ldots\ldots (1)$$

Now the sum of the mean effective pressures of the high and low pressure cylinders will be equal to the total mean effective pressure or

$$H + E = Q \quad \ldots\ldots (2)$$

Substituting value of H from formula (2) in formula (1), we have

$$\frac{Q - E}{E} = R \quad \ldots\ldots (3)$$

from which

$$E = \frac{Q}{R + 1} \quad \ldots\ldots (4)$$

The tractive force of the low pressure cylinder is

$$T = \frac{E\,c^2\,S}{D} \quad \ldots\ldots (5)$$

Substituting value of E from formula (4) in formula (5), we have

$$T = \frac{Q\,c^2\,S}{(R + 1)\,D} \quad \ldots\ldots (6)$$

Since we have assumed equal power for the high and low pressure cylinders, the tractive force of both pairs of cylinders is double that of the low pressure cylinder, or

$$T = \frac{2\,Q\,c^2\,S}{(R + 1)\,D}$$ which becomes: **(7)**

$T = \frac{1.7\,P\,c^2\,S}{\left(\frac{c^2}{C^2} + 1\right)D}$ for locomotives with approximately 90 per cent. maximum cut-off, and

$T = \frac{1.5\,P\,c^2\,S}{\left(\frac{c^2}{C^2} + 1\right)D}$ for locomotives with approximately 50 per cent. maximum cut-off.

[Exhibit A also included a comparison of the proposed formulæ with others now in common use, worked out to cover a large number of different Mallet type locomotives.—Editor.]

Exhibit B—Comparative Merits of Hydrostatic and Force Feed Lubrication

In the investigation of this subject last year it was found that there was very little definite information available. While each system of lubrication has its supporters, it is the feleing of the committee that the positions taken were largely the result of personal opinion rather than conclusions formed from competitive experience.

In consideration of the lack of available data last year, the committee outlined a program of tests and recommended that a number of roads using mechanical lubricators, either as a general practice or experimentally, conduct an investigation conforming to the suggested outline of tests for the purpose of developing some information of a directly comparable character. The proposed program was printed and sent out by the Secretary under the caption "Circular DV-318," together with a request for co-operation in the investigation of this subject. Very little voluntary response resulted from the circular, and it was necessary to make a direct appeal to the different railroads having mechanical lubricators, soliciting their co-operation in carrying out the program as outlined in the above mentioned circular. In response to this appeal, expressions have been received from 14 roads to the effect that they will co-operate with the committee in an effort to develop something definite upon this subject:

Reports have been received from nine roads that have already made some progress in connection with this program, covering performance observed on a total of eight passenger and seven freight locomotives. The tests do not cover a sufficient period of observation to justify any conclusions from the results. Of 63 cylinder packing rings removed during the periods covered by the reports, 34 were removed from the side of locomotives equipped with mechanical lubricators and 29 from the hydrostatic side. The valve ring renewal was equal, 20 having been removed from each side. No appreciable difference has been observed as to the carbon deposit between the mechanical and hydrostatic systems. The rate of oil consumption covers rather a wide range. On passenger locomotives the mechanical lubricator consumption ranges from 50 to 203 miles per pint. With the hydrostatic system the range is from 50 to 98 miles per pint. In freight service, with the mechanical system the lubrication runs from 25 to 85 miles per pint. These results are cited more as a matter of general information than in an attempt to convey the impression they are in any way representative figures.

With the co-operation of the roads that have signified their intention to assist the committee along this line of research, some very valuable data should be forthcoming at the next meeting of the Association. In order that the data may be complete and available at that time, the roads having already furnished preliminary reports are requested to continue their test upon the equipment they have under observation. The test should be continued over a period sufficiently extensive to produce data that will be representative of the conditions to which the lubricating systems are subjected.

In addition to the information outlined in Circular DV-318 relating to the wear of the lubricated parts, consumption of lubrication, etc., a record should also be established of the attention required to maintain the lubricating systems. The dependability of the mechanical construction and the maintenance attention are factors to be reckoned with before arriving at definite conclusions.

The report is signed by H. T. Bentley (chairman), C. & N. W.; J. A. Pilcher, N. & W.; Geo. McCormick, S. P.; H. A. Hoke, Penna. System; C. B. Young, C. B. & Q.; M. F. Cox, L. & N.; W. I. Cantley, L. V.; C. E. Brooks, Canadian National; G. H. Emerson, B. & O.; H. H. Lanning, A. T. & S. F.; A. H. Fetters, Union Pacific; S. Swight, Northern Pacific; and W. L. Bean, N. Y., N. H. & H.

Discussion

J. Snowden Bell: The subject of design and construction of locomotives is manifestly one of the most important that this Association can consider. The title is a very comprehensive one, and in the report of the committee it seems to me that there are two matters at least that are not referred to, and that ought to have careful consideration in the committee's report. One of them is the half stroke cut-off. The other is the three cylinder locomotive. These are matters of design that are properly attracting a great deal of attention and it seems to me the committee should include them in the report if they are able to do so.

C. E. Chambers (C. R. R. of N. J.). We are at a time when a great many exacting comparisons are made, one road with the other, as to mileage per failure, and it does not mean anything today. I am heartily in accord with the committee defining what is an engine failure.

Mr. Bentley: The committee was instructed to try to compose the various ideas, and we have had the co-operation of the locomotive builders and also of the Bureau of Statistics at Washington, so that I think we are about prepared now to give you something that can be uniformly and satisfactorily used.

A. Kearney (N. & W.): A great deal of time has been put on this report in an endeavor to harmonize the various methods and that, I think, has been accomplished. We should have an arbitrary figure in referring to the tractive force of an engine. Ordinarily we would speak of the tractive force being 25 per cent. of the weight on the drivers. If the cylinder power is below that, then the lower tractive force should be shown. If higher we should continue to use the 25 per cent. On electric power we should use 30 per cent. If we can do that, it would be an easy matter to calculate the tractive force of a locomotive.

W. S. Moseley (C. C. & O.): In fixing these formulas for the 50 per cent cut-off, does that refer to the 50 maximum cut-off, or 50 per cent cut-off of the regular value setting?

F. H. Hardin (N. Y. C.): The 50 per cent cut-off refers to the Pennsylvania Mallet and not to the regular valve setting.

Prof. L. E. Endsley (U. of Pittsburg): The only things I see in this new formula are the 1.7 per cent and 1.5 per cent factors. If they are as accurate as the 85 per cent in our old formula, then the new formula is correct.

C. T. Ripley (A. T. & S. F.): The constant in the committee's report was secured from the tests made on the Pennsylvania.

Mr. Hardin: Prof. Endsley has stated the problem correctly. The only thing in the formula is the change in the constant. Apparently that was arrived at from some tests made under Mr. Hoke's supervision, and before taking a vote on this question it seems that some brief explanation should be made by Mr. Hoke personally as to the derivation of the figures.

Mr. Chambers: I move you that action be deferred until tomorrow when we can get some more details from Mr. Hoke. Motion seconded and carried.

Mr. Kearney: The report on forced feed lubricators is not much more than we had last year. Probably you will remember we said that we were having a great deal of difficulty in getting information. The Norfolk & Western considered that there should be something in this method of lubricating the locomotive, especially the low pressure cylinders. Some 20 or 24 railroads have signified their willingness to co-operate. They have secured some of the different kinds of forced feed lubricators for comparison with the hydrostatic and we expect to get some figures from them. There are but two or three in the market. They give some trouble generally on account of mechanical operation, and that must be overcome. We still believe that we should pursue the subject.

G. S. Goodwin (C. R. I. & P.): The Rock Island has been using the forced feed lubricator on all the new engines that it has bought for a number of years. It gives a much more even lubrication than the hydrostatic. We do find that it has got to be watched and kept in repair to get results.

Mr. Chambers: What care is required?

Mr. Goodwin. We found cases where the lubricators were not filled at terminals. We found cases where, due to the ideas of engineers or others, the adjustments were changed so that the lubricator would either throw too much oil and get dry before the run was completed, or throw too little oil. Those lubricators are adjusted by the manufacturers so that they use the correct amount of oil and these adjustments should not be interfered with.

Mr. Chambers: We have a number of engines on the Central of New Jersey, equipped with forced feed lubricators, and the principal care was to keep them filled. Some would make one trip and come back full, and before you would get half way through another trip the lubricator would be empty without anybody changing adjustments. I believe the principle of the forced feed lubricator is right, but so far I have never felt justified in applying it.

O. S. Jackson (U. P.): We first started out with both the hydrostatic and the forced feed lubricators. We now find that the forced feed is so reliable that we are removing the hydrostatic and depending wholly on the forced feed. The forced feed should be so designed that the engineer cannot tamper with the adjustment of the feed.

Mr. Bentley: The cabs of the locomotives are getting so filled with pipes, connections and various devices that you will have a difficulty if you try to put in a hydrostatic lubricator in a cab already crowded because there is no room to put the hydrostatic lubricator.

Mr. Jackson: We had a condition such as that just referred to where there was so much equipment in the cab that it was difficult for the engine man to see the water glass or operate the gage cocks. By removing the hydrostatic lubricator we were able to put in a water column and also make the water gage cocks more accessible.

S. Zwight (N. P.): The Northern Pacific has some of the forced feed lubricators located in the cab, and they have been mostly on switch engines or Mallet engines where we have no difficulty in keeping them filled, but how is this going to work out with the tendency now for extending engine runs from 200 to 500 or 600 miles? With the hydrostatic lubricator right under the eye of the

engine crew, they will fill it when it becomes empty. But it is a matter of supervision to take care of the forced feed lubricator and see that it is filled at each terminal.

Mr. Jackson: We have runs as long as 577 miles and we make that on one filling of the forced feed lubricator. We have some engines on 500-mile runs, some as long as 644 miles equipped with the hydrostatic lubricator and they have to be filled at intermediate points.

Mr. Kearney: The Norfolk & Western has had some trouble maintaining the pipes running to the lubricator and in keeping the check valves open for filling, as a result of condensation.

Mr. Jackson: We had some trouble from the pipes breaking, but that was due to the manner in which the lubricator was attached to the valve chamber. A special bracket was put on to relieve vibration and that has relieved the trouble. We clean the check valves once each month when we give the engine a monthly inspection.

B. J. Farr (Grand Trunk Western): We are running our passenger trains from Chicago to Port Huron, a distance of 334 miles on forced feed lubrication, hauling a 12-car train and using six pints of oil. About seven pints are used with fourteen cars. We find that Mikados are getting about the same mileage with the forced feed as with the hydrostatic lubricators. The only difference is that our engines are better lubricated and we feel we are saving fuel. The life of the cylinder packing has increased considerably. We have at the present time 28 engines equipped with forced feed lubricators.

C. E. Brooks (Canadian National): We have noted a distinctive improvement in engine performance due to the better lubrication, and to the more consistent lubrication, since we have adopted the forced feed lubricator as standard. We use the same type of lubricator as the Union Pacific.

William Joost (C. M. & St. P.): We have a few of these lubricators on our locomotives and have had considerable mechanical difficulty with them. We find that while they are working they are giving very good results, but we have had considerable trouble with some of the checks and operative mechanisms.

Chairman Purcell: Are your lubricators located on the front end of the engine?

Mr. Joost: On the steam chest.

Mr. Zwight: I would like to ask Mr. Brooks if they have a hydrostatic lubricator on the Canadian National locomotives in addition to the forced feed lubricator?

Mr. Brooks: No. We believe, just as Mr. Jackson does, that the forced feed lubricator is a real machine and there is no necessity for any hydrostatic lubricator when the forced feed lubricator is used. We use only the two feed type, but for heavy passenger service we use the four feed and make no attempt at all to insulate any of the piping.

The first forced feed lubricator that we applied worked successfully during the first winter with exposed piping in 40 and 45 deg. below zero. The condition of the piston rods, piston packing, cylinders and valve chambers has been distinctly improved since we went to that type of lubricator.

Chairman Purcell: Mr. Brooks, have you had any mechanical troubles with your lubricators such as the gentleman from Milwaukee pointed out?

Mr. Brooks: No, we have had practically no trouble whatever. There are cases of bad check valves, dirty oil, negligent men filling lubricators and all the other troubles that go with lubricator work, but we can't blame that on the mechanical device.

A. H. Fetters (Union Pacific): On the Union Pacific we are lubricating a number of Mallet locomotives with the forced feed lubricator and our first experience was to have a separate lubricator for each of the high pressure and low pressure units. Recent experiments indicate that we can do very well with a single lubricator by going to five feeds. The four feeds are on the high pressure engines and are tapped into the steam pipe. The fifth feed is introduced into the receiver on its way to the low pressure cylinder. We find that it lubricates just as well as the two units did because the surplus oil from a high pressure unit eventually finds its way to the low pressure cylinders.

Mr. Bentley: We had a lot of engines come to us with the oil going into the valve chamber as well as into the cylinders. After some experiment we found that one connection into the steam pipe was sufficient on each side.

Mr. Farr: The first ten of our Mikado engines had the four-feed arrangement. About three months ago we discontinued the cylinder feeds and lubricated the engines entirely through the steam chest. From the reports there appears to be more satisfaction and just as good a lubricated engine and at the same time we are saving oil. I believe we will eventually go to the two-feed lubricator.

Geo. McCormick (Sou. Pac.): Mr. Farr, do you use the piston swab?

Mr. Farr: We do not, and you will always find a nice film of oil on the piston rods and valve stems.

Mr. McCormick (Southern Pacific): We believe that the mechanical lubricator is the eventual method of lubricating a locomotive. It is a matter of perfecting the machine so that it will be of service. We have 12 or 14 in service and are trying them out on our unimportant trains. These trains stop a long time on sidings and it gives us an opportunity to see the condition. We are watching our neighbors with a great deal of interest and we are approaching the subject conservatively.

H. H. Lanning (A. T. & S. F.): We find you can lubricate a locomotive for a short time with the hydrostatic lubricator satisfactorily, but that eventually the valve rings become dry. We find that there is little difficulty in maintaining the lubricator in a mechanical way. We can depend upon it feeding oil. We do find that some means must be provided whereby an engineman can make a change of adjustment in the lubricator to compensate for change in grade, or there will be a loss of oil as compared with the consumption of oil in the hydrostatic lubricator. A mechanical lubricator that delivers all of its oil through the valve chamber does not work more successfully than the old hydrostatic lubricator that is connected up in the same way. By putting part of the oil into the cylinder and part of it into the valve, there will be perhaps a varying of proportions, depending upon grade conditions, superheat, cut-off, etc. We are getting very satisfactory results from the mechanical lubricator.

M. A. Kinney (H. V.): We are believers in forced feed lubrication. It seems to be a necessity and has always been quite prominent in stationery and steamship practice. We have, therefore, made trials with two types of force feed lubrication on Mallet and Santa Fe type locomotives. The results have shown an equal and satisfactory distribution, but the engineer must have some control of the lubrication. You will get into conditions for a heavy pull, bad water, or foaming locomotives, and you are going to have trouble unless he is in a position to control. On account of this we have not had as satisfactory results as we had expected.

Mr. Goodwin: You have got to give an engineer a chance to vary the amount of oil on a hard pull.

Mr. Lanning: As a rule when you are working the engine hard your valve is making a comparatively short stroke. That reduces the amount of oil feed by a mechanical feeder. When you are drifting down hill you have increased the amount of oil fed when you don't need it. We find in order to give a locomotive sufficient oil when the lubricators are handled in that way that we must proportion the feed of the locomotives in order that the short cut-off will receive an adequate amount of oil. When drifting the full gear gets too much.

Mr. Jackson: We drift our engines when they are hooked up with the short cut-off, under steam, and we find that we get sufficient lubrication when drifting.

Mr. Farr: We follow the same policy with a short cut-off and we have no trouble with our engines lubricating on the heavy drive on account of the construction of the lubricator which is designed to give sufficient oil.

F. H. Hardin (N. Y. C.): We have very good success with the lubricators. We have a few difficulties with the driving mechanism but not with the lubricator proper.

The Chairman: If there is no further discussion we will close the discussion on this paper because it will be acted on tomorrow. I think we can discuss for a few minutes the subject of water columns.

Discussion on Water Columns

Mr. Jackson: We are using water columns in which the opening at the top two inches and 1¼ in. at the bottom. As our heavier power goes through the shop we are equipping with water columns.

Mr. Lanning: We find when openings are kept clean that the water columns are reliable instruments for indicating the water level. An interesting feature comes up in connection with this, however. When a locomotive is using water it has a tendency to foam or to rise in the boiler. That tendency will exhibit itself in the gage attached to the water column and it will show up where the gage cock is attached direct to the boiler.

Mr. Coddington: Out West, where we have co-operated with Mr. Pack in his early observations in connection with water columns, it was very clearly demonstrated that the water was not being registered correctly in water glasses connected directly into the boiler head. This condition was promptly relieved with the application of water columns. Since that demonstration was made we have been going right along, and in time water columns will be put on all locomotives with large sized boilers.

Mr. Pack: I do not believe there is a locomotive in the United States or anywhere in the world in fact with a wide fire box, equipped with arch tubes, brick arches and a sloping back end, that there is not a variation of from four to six inches or more in the water level indicated by the gage cocks and the water glass while the locomotive is in operation. It is evident that both of those readings cannot be correct. It has been noted that some engineers depend almost wholly upon the water gage cocks and

not on the water glasses. If the gage cocks are inaccurate it seems to me a very important thing that early steps should be taken to remedy this defect. So far as I am advised the water column is the best thing yet devised.

C. E. Chambers, Supt. of Motive Power (C. of N. J.): One of our principal troubles was the possibility of closing the cock or partially closing the cock at the top. If you did that you did not have any gage cock or water glass, so we must depend on gage cocks somewhere on the boilers as a check against the water glass. We continued that practice up to possibly eight or ten years ago when some locomotives were built that were not practicable on account of the condition of the boiler head and the size of the water column. We then connected the water glass directly into the boiler, with the water glass on one side and gage cocks on the other. Our present practice has been to use two water glasses. I think this is fairly reliable and both cannot be wrong at the same time.

Mr. Pack: The valve at either the top or bottom of the water columns is one of the most dangerous appliances you can put on a locomotive. I had experience some ten years ago with a water column where the valves were applied in this manner, and some one carelessly or maliciously closed the top valve and when the engineer got on the engine he proceeded to blow the boiler out, thinking that it was full of water and seriously damaged the crown sheet.

G. E. Parks, Mechanical Engineer (M. C.): In connection with the water column it seems to me you have got to have the water glass register correctly, and in order to do this the area at the opening above and below should be as nearly the same as possible. The proper way to do this is by having a choke which will give practically the same diameter of the top and bottom so that in case the top is closed or the water trapped to some extent it will not interfere.

Mr. Lanning: It is necessary to have the plug arranged so that you can clean out the horizontal branch of the column and also one that you can clean out vertically. We find it necessary to have a freer opening at the top than at the bottom.

W. H. Flynn (M. C.): We have adopted a policy of applying water columns and while we have had some difficulty we found that we could readily overcome it. We feel with the modern locomotive which is vastly different from the old time locomotives, that water columns are very essential. We are having splendid results and the men like it.

Mr. Hall (Assistant Chief Inspector of Locomotives): I would like to say since the application of about 105 water columns on a certain railroad, the application was made on a larger boiler than they had previously been operating and the evaporation was of course much more rapid. Unfortunately they had many crown sheets damaged due to low water. Tests were made on that railroad under the supervision of Mr. Pack, and we found that, regardless of the height of the water as shown by the water glass, there was always plenty of water in all three gage cocks. We made arrangements whereby we could tell approximately where the water was and we let the water go down, while drawing 105 freight cars, so that the water just barely showed in the bottom of the glass. On these particular tests we always had three locomotives and we had an extra gage cock applied three inches above the ordinary gage cock. This showed us that at that time we had about nine inches more water than was indicated by the gage cock than that showed by the water glass. The company went along with us and equipped practically all of these locomotives with the columns. Since that time it has had only one of that particular type of locomotive damaged by low water since the application of the columns. That was in the fire trap. As to removing the drain from columns, I do not think we would go along with that. We want the drain on these columns so that they can be blown out frequently. Where the locomotive has been equipped with a column, we have only had in the last four years, three cases where there has been serious damage to the crown sheet. On one of those our inspectors found that there was about six inches of sediment lodged at the bottom of the column, which was due to negligence in using the drain which was applied in this case.

The column is no more fool proof than any other appliance placed on the locomotive. It must be clean. That is why Mr. Pack specified the three-quarters cleaning plug opposite the bottom opening and into the boiler.

Mr. Rooks (Canadian National): We have applied a great number of water columns. They are not of the design commonly known in this country as the Pack design. They are so different that the bottom opening is only 5/8 in. in diameter and the top 1½ in. We have at the same time on certain of these engines and on engines on the American lines the other type of water column. There is little or no difference in the operation of the two types of columns. We do not believe that the large bottom opening is one whit better than the small. As far as the water column performance as compared with the old type of registering is concerned, I do not believe that under the circumstances where the water conditions are good that the column gives any better registry than the old devices. Under conditions where there are large fluctuations in the boiler, we believe that the water column has improved conditions for the engineer to such an extent that we are standardizing on the use of the column. The column which we use becomes practically part of the boiler because it is a one-piece steel casting flanged and welded and in some cases provided with means whereby the staybolt on the back head actually passed right into the bracket. This we believe does away with a great deal of the obstruction in the cab and at the same time provides a greater measure of safety in case of an accident. Relative to the gage cock being used as a means of registering, I would like any mechanical man to get on the locomotives and see what evidence there is of the gage cocks ever having been opened except at inspection periods.

H. T. Bentley: I would like to know whether they can throw any light on the possibility of using one or perhaps two standard columns for all the various classes of engines that are used in the United States. If so, that will still further help the committee.

B. J. Farr (Grand Trunk Western): We are using one column on all our different classes of engines and it is working out very satisfactorily. We find it necessary though, to rearrange some of the cab mountings to accommodate it, but it works out all right. The water glass is on the left side.

The Chairman: How is that attached to the boiler?

Mr. Farr: On the left hand side. The mounting screws go into the boiler on the back head and the communication is from the top.

Mr. Lipscomb (Southern Pacific): We are making an application of water columns right along as our engines go through the shop. We have had very satisfactory results. We have had some little trouble mechanically in applying them on account of some of the old arrangements in the cab. Aside from that we have had very good results.

Mr. Pack: Notwithstanding the chaotic conditions that we went through during the fiscal year 1923, something has served to reduce the number of crown sheet failures in this country by forty per-cent. as compared with 1912. The number of locomotives have increased about 12 per cent. during that period, and the tractive effort has increased about 58 per cent.

Mr. Rooks: In the period somewhere around 1912 there was a great increase in the number of wide fire box engines. There were a great many railroads that got larger-sized power than they had ever had before. There were difficulties on various railroads with the crown sheet. However, as time has gone by railroad men have generally become better accustomed to the handling of the wide fire box and arch tube engines. This has had as much to do with the reduction in the number of crown sheet failures as any appliance that was ever put on the locomotives.

The Chairman: Mr. McCormick, are you attempting to standardize on your water bottles by making them adjustable to different types of locomotives?

Mr. McCormick: We are just standardizing by confining our efforts to one type of locomotive.

Mr. Smith (Boston & Maine): It occurred to me that in searching for a standard column which might be adaptable to the greatest range of locomotives to comply with the so-called Pack design, that the use of a brass or bronze casting requiring large pads for the tapping of the gage cocks in different positions to accommodate other fittings on the boiler would be a good thing. We selected a steel tube of ½-inch wall as being the type of a column with brass and bronze fittings top and bottom that would be best adapted to all classes of locomotives.

We found that where the cock for the upper connection of the water gage was tapped in at a right angle that there was some pocketing or condensation while the engine was standing. This caused a false reading in the water glass with the result that we now tap that fitting in at an angle of about ten degrees.

Mr. Zwight: We received some new engines in 1920, with water columns. There were no specifications and the manufacturers used a brass nipple. Shortly after the engines went into service we found one or two of them checked slightly. It would be very dangerous to have one of them break off without any means of shutting it off and we immediately had them changed to mild steel. I think it is important that the water columns have a good heavy nipple to make it safe to carry the weight and a good bracket to support it on the boiler head.

Mr. Smith (Boston & Maine): There were some of our engines equipped with a short nipple connecting into a globe type valve. We have had failures of those nipples and we adopted an angle valve with a heavy shank threaded into the boiler which we believe will avoid the breakages which formerly occurred in nipple connections.

Mr. Blunt: Our standard is to use strong columns for the reason that it would have a greater factor of safety and a much less tendency toward possible breakage. Of course we have had

to be very particular about the top connection to be sure that there would be no pocketed water there.

Mr. Reno: Our position in this matter is very much as described by Mr. Blunt. When left to us we put on a steel column, but of course we are obliged to put on the columns specified by the railroad companies. We do so unless there is something in the design or in the workmanship which we think should be brought to their attention in which case the matter is usually comprised. We are also careful to avoid the pocket that we are likely to get by a lack of care in making the proper conne tion.

O. C. Cromwell (B. & O.): On the Baltimore & Ohio we use the bronze column and we connect that to the back head of the boiler with a forged steel stud. The stud remains a permanent attachment to the boiler. The steel stud is used because of the liability of a failure of a bronze stud. Frequently it is necessary to strain the stud in order to bring the column to a vertical position. We also provide for a plug in the column opposite the stud connection of the boiler for convenience in cleaning. We have an offset fitting at the bottom, a T-connection whereby we can remove the plug and clean the column vertically. We follow the general practice of extending the bottom connection to the column some distance in beyond the back head of the boiler and sufficient distance away from the back door sheet of the fire box in order to get out of the line of the rapid upward flow of the water. On the top connection we found it desirable to place the angle cock in the column at something like 110 deg. to relieve the possibility of a collection of water at that point that would give a false reading in the water glass. We use two water glasses, one on the column and one on the left hand side. We also use the three gage cocks.

W. L. Bean (N. Y., N. H. & H.): You put on a water column with a water glass in the column. You put another water glass on with the usual fittings, in the back head. Can you depend on the water glass on the back head? The reason I bring that out is that one man who has gone into this matter very thoroughly told me that the essential purpose of the water column was to give a correct gage cock reading, and that therefore that the water glass which is on the back head will register with the one on the column naturally, the greatest part of the time the engineman does not pay any attention to his gage cocks. He is following his water glass. It might be fruitful to have that point brought out by some one.

The Chairman: The two glasses will not register together.

Mr. Bean: Then the information I received was wrong. It was from a gentleman connected with the Inspection Bureau of the Government, that the two would register together and that the essential purpose and intent of the water bottle was to give correct gage cock readings.

The Chairman: Where you have got the water glass tapped into the sloping sheet back head you will find quite a variation in the readings, particularly when you are working an engine hard.

A. G. Pack: (Bureau of Loco. Insp., I. C. C.) Is there any man in the room who believes that a fireman can intelligently and economically fire a locomotive where you can't keep in close touch with the level of the water in the boiler at all times? It is a matter of economy to apply a water glass on the left side for the convenience of the firemen and as an additional check to the engineer. That the gage cocks and water glass on the right side should be in close proximity to the engineer so that he won't be required to take his attention from the track and signals ahead in order to read the water glass or try his gage cocks, which may require 30 seconds to a minute when he is running a fast train.

Mr. Bentley: I think Mr. Bean wants to find out whether the water glass on the left side of the engine will register about the same as the water bottle on the right side.

G. E. Parks (Michigan Central): You have your water glass on the left hand side, the top connection approximately 14 or 15 in. from the back head and you will get the same readings, but if it is connected nearer the back head, then your readings might be different.

Mr. Zwight: The water glass that is tapped direct into the boiler will register higher than the water column but the extent of that will depend largely upon the condition of the water in the boiler.

If the boiler is foaming then it will record stronger in the water glass because it is not getting any dry steam to equalize it. We have a variation from ½ in. to 1½ in. between the two water glasses, but I never figure that there is anything about it that brings about a dangerous condition.

The Chairman: Is it not the practice of all of the railroads in applying those water columns to make their connections 12 in. to 14 in. forward at the back head?

Mr. Pack: I can't say what the general practice is. My experience after a very considerable study and a great many experiments indicated that the connections in the water column and the water glass steam pipe connections should be made in close proximity and as near the back head of the boiler in front of the back head seam as could be consistently made in order to obtain dry steam to balance the water in the glass at all times. That largely depends upon the dry steam space, in other words, the height of the back head above the crown sheet, as to how far you will have to go.

There is something wrong when you get two registrations. The water glass has proved much more sensitive than we dreamed it would be. If anybody told us 10 years ago that a spoonful of water trapped in the top of the water glass would cause a 4-in. rise in that water, we thought he was crazy, but I can show you it will do so, and I have shown it hundreds of times, that it does do so.

Mr. Bean: Since we have this water movement up the back head, what may have been developed and what is the most satisfactory form of the end of the stud that projects into that water in relation to the velocity of the water? Is it to the best interests to cut it off square or at an angle to offset the forcing tendency of that water?

Mr. Zwight: That depends on the condition of the back head sheets. If they are tapped into the boiler head with a crowfoot nearby that will cause bubbles you will not get the proper reading, and then by extending the nipple inside of the sheet so that you get away from that, then you would get a correct reading.

Mr. Pack: Mr. Chairman, the tendency of all gases is to rise vertically. Steam bubbles, as they are formed in the water, rise vertically. If your bottom connection is tapped in at right angles to the sloping back head the tendency is for those steam bubbles in going up into the column, and raise the water in the columns or water glass.

When these spud steam bubbles rise, they form a film against the sloping head sheet, and rise along with it. If the gage cocks or water glass cocks or column cocks are cut off even with the sheet you are inviting that film of steam right into that column or water glass. If it extends further away it passes by with the least possible influence. If there is any obstruction both with water glass cock or water column cock, even though the end or the angle iron is one inch wide it will raise the water varyingly.

All devices in the boiler for registering water should enter horizontally and be cut off at right angles and extend beyond any obstruction that may be immediately above so as to avoid the steam bubbles which accumulate at the back end.

Mr. Cromwell: There is another point that it will be well to discuss and that is what is the proper size to be used? How many different sizes of glass tubes are used in the water glass and what have been the result? Some use 5 in. and some use ¾ in. outside diameter with a wall about ⅛ in. thick. Which has given the better results?

Mr. Bentley: In conection with the investigation of the use of a standard water column we found there were a lot of roads using the reflex type of glass for the connections, top and bottom, with a ¾ in. diameter and of course it makes it very difficult to use that particular fitting for a ⅝-in. glass which, I think, is generally considered standard diameter?

Mr. Goodwin: The standard on the Rock Island is ⅝ in. outside diameter. That size was adopted when we went from the old tubular glass to the reflex glass so the reflex would fit the same cocks used for the tubular glass.

Mr. Jackson: We use a reflex glass with the ⅝-in. stem.

A. P. Prendergast (Texas Pacific): We use the ⅝-in. tubular glass, Mr. Chairman.

(After a general discussion on engine failures, the meeting adjourned at 1:30 P. M.)

Busses to Electric Locomotive Exhibit

THE ELECTRIC locomotives being exhibited by the Pennsylvania Railroad are located at North Providence Terrace, about four blocks west of the Boardwalk. This is not within easy walking distance of the pier, and busses have been provided to carry convention attendants to and from the exhibit. These busses will leave from Missouri Avenue at the Boardwalk, one block south of the pier, every hour on the hour, from 9.00 a. m. to 1.00 p. m., inclusive, after which they will maintain a half-hour schedule until 6.00 p. m. A sign on the busses will identify them.

Exhibit Notes

AN ADDITIONAL exhibitor should be added to the list which was published in Wednesday morning's *Daily*. It is the Ulster Iron Works, Dover, N. J. —special staybolt iron, special drilled hollow staybolts and Ulster bolt iron. The company is represented by H. A. Gray, H. T. Bradley, E. W. Kavanagh, C. F. Barton, J. H. Craigie and John C. Campbell. Space 578.

The International Motor Company had expected to have its new Mack motor car on the exhibit track during the convention. Unfortunately it was found at the last moment that it would be impossible to get it here in time for the meeting.

V. A. Dickinson is here as a representative of the Heywood-Wakefield Company and the Tuco Products Corporation. His name was omitted in the lists which we published yesterday.

In listing the representatives of the Henry Giessel Company, the name of Frank N Grigg was misspelled. This was also true in the case of W. L. Colton, of the Globe Railway Equipment Company.

Election of Executive Committeemen for R. S. M. A.

THE ANNUAL meeting of the Railway Supply Manufacturers' Association will be held on Saturday of this week. It will be preceded by the annual election, which will be held in the Executive Committee meeting room to the right of the entrance inside of the pier. The polls for the election will open at 10.00 a. m. and close at 11.30 a. m.

It will be necessary to elect two members of the Executive Committee for District 3, comprising the State of Pennsylvania; one of these will be elected for two years and one for three years.

One member will be elected for a term of three years from District 4, comprising Ohio, Indiana and Michigan.

One member will be elected for a term of three years from District 5, comprising the State of Illinois.

One member will be elected for a term of three years from District 6, comprising the States of Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky and Tennessee.

One member will be elected for a term of three years from District 8, comprising Canada.

Each member company of the association is entitled to one vote by the representative designated by them.

For R. S. M. A. Members

THE RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION has notified its members that the meetings of Division V—Mechanical, A. R. A., will be held in the Greek Temple at the outer end of the pier. They will begin promptly at 9:30 a. m., and will be held only in the forenoon so that the railway men will have the entire afternoon of each day to inspect the exhibits. In order to facilitate this plan and enable the meetings to start promptly at 9:30 a. m., it is suggested that the exhibitors allow the railway men to pass directly through the exhibits between 9 and 9:30 a. m. without stopping them for consultation about exhibits.

Enrollment

THE ENROLLMENT booth will be open today from 9.00 a. m. to 1.00 p. m.; 2.00 p. m. to 6.00 p. m. and 7.00 p. m. to 8.00 p. m.

Registration Figures

THE REGISTRATION figures this year for the first day demonstrate the popularity of the convention this year. A total of 3,018 were registered up to the close of the afternoon registration at 4 p. m. This is the greatest number since *Daily* records of attendance were compiled in 1911. Only once during this time was the registration of railway men at 4 p. m. of the first day exceeded. That was in 1914, when 450 railroad men registered. More supply men, railway ladies and supply ladies were registered yesterday than ever before at the close of the afternoon of the first day. Below are comparative figures for 1920, 1922 and 1924:

	1920	1922	1924
Members Mechanical, A. R. A.	355	360	435
Members Purchases and Stores	9	13	8
Special guests	102	107	182
Railroad ladies	251	148	337
Supply ladies	354	281	380
Supply men	1517	1140	1676
Total	2588	2049	3018

Mechanical Division Committees

CHAIRMAN PURCELL appointed the following committees at yesterday morning's session:

Committee on Subjects: C. F. Giles (L. & N.), J. B. Coleman (C. N. R.), L. K. Sillcox (C. M. & St. P.), F. M. Waring (Penna.), and O. C. Cromwell (B. & O.).

Committee on Resolutions: C. E. Chambers (C. of N. J.), J. E. O'Brien (S. A. L.), and A. G. Trumbull (Erie).

Committee on Correspondence: A. R. Ayers (N. Y. C. & St. L.), R. L. Kleine (Penna.), and G. W. Rink (C. of N. J.).

Motor Train Makes Long Trip

A CHICAGO GREAT WESTERN gasoline motor train, consisting of a motor coach and trailer, arrived at Atlantic City, Tuesday, after a trip of 1250 miles under its own power. It left Oelwein, Iowa, Saturday morning and ran via Chicago Great Western to Chicago, Baltimore & Ohio to Philadelphia, and Reading to Atlantic City. The trip was made on regular passenger train schedule, with night stops at Chicago, Youngstown, Ohio, and Baltimore, Md. This train is being exhibited by the Sykes Co., St. Louis, Mo., the manufacturers, and is located on the Mississippi Avenue track.

Registration, American Railway Association

Division V—Mechanical

Albers, L. H., Supvr. Air Brakes, N. Y. C., Haddon Hall.
Allen, C. E., G. M. M., N. P., New Belmont.
Allison, W. L., Marlborough.
Anderson, E. C., Mech. Eng., C. B. & Q., Traymore.
Andrews, W. E., M. M., A. & S., Pennhurst.
Andrucetti, J. A., Asst. E. E., C. & N. W., Traymore.
Band, Roy W., Supt. Loco. Maint., B. & M., Chelsea.
Bardwell, R. C., Supt. Water Supply, C. & O., Ambassador.
Barnhill, C. F., M. M., G. C. & S. F., Dennis.
Barr, J. W., Asst. Ch. Draftsman, P. & R.
Barry, F. J., M. M., N. Y. O. & W., Haddon Hall.
Barry, J. L., M. M., N. & W., Haddon Hall.
Barton, D. E., Supt. Shops, A. T. & S. F., Brighton.
Barton, T. F., G. M. M., C. & O., Ritz Carlton.
Bawden, Wm., S. M. P. & E., I. C., Strand.
Bean, W. L., Asst. G. F., N. Y. N. H. & H., Traymore.
Beattie, J. A., Gen. Supt., Lake Terml., Marlborough.
Becker, Harry G., Shop Supt., D. & H., Marlborough.
Bell, R. W., G. S. M. P., J. C., Dennis.
Bernstein, E. R., V. P. & G. M., L. & N., Ambassador.
Black, R. L., M. M., N. & W., Haddon Hall.
Black, W. G., S. M. P., N. Y. C. & St. L., Haddon Hall.
Bleick, W., M. M., S. P., Traymore.
Bliss, H. A., M. M., B. & M., Chelsea.
Bohnstengel, Walter, Asst. Eng. Tests, A. T. & S. F., Haddon Hall.
Booth, J. K., M. M., B. & L. E., Traymore.
Boughton, N. J., Eng. Tests, M. K. & T., Traymore.
Bourne, Geo. B., R. F. of Equip., D. & R. G. W., Kentucky.
Brazier, F. W., Asst. G. S. M. P., N. Y. C., Marlborough.
Brooks, C. E., Ch. M. P., C. N. R., Haddon Hall.
Brown, B. S., Asst. Eng., Penna., Iroquois.
Bruehler, G. H., Ch. Insp., A. R. A., Runnymede.
Burel, W. C., M. M., W. A.,
Bullnick, R. D., R. F. E., A. C. L., Chalfonte.
Burns, John, Works Mgr., C. P. R., Ambassador.
Burton, Thos. L., Air Brake Eng., N. Y. C., Marlborough.
Butler, F. A., S. M. P. & R. S., B. & A., Traymore.
Caley, Geo. W., M. M., N. Y. C., Fredonia.
Callahan, P. J., Supr. Car & Loco. Lgt., B. & M., Chelsea.
Callison, W. A., S. M. P., C. J. & L., Strand.
Cantley, Wm. I., Mech. Eng., L. V., Traymore.
Campbell, C., Asst. Eng., N. Y. C., Chalfonte.
Campbell, P. A., M. M., C. R. & Ind., Shelburne.
Carroll, J. T., Gen. Supt. M. P., B. & O., Traymore.
Carson, F. L., Gen. Supt., S. A. & A. P., Haddon Hall.
Cartwright, Kenneth, Ch. Mech. Inspr., N. Y. N. H. & H., Eastbourne.
Chambers, C. E., S. M. P. & E., C. of N. J., Dennis.
Chandler, C., Asst. Engineer of Bridges, I. C., Ambassador.
Chapman, E. E., Eng. of Tests, A. T. & S. F., Haddon Hall.
Chase, E. P., Asst. Eng., Penna., Pennhurst.
Chass, H. C., G. F., N. Y. N. H. & H., Ambassador.
Chase, M. D., Shop Supt., M. K. & T., Princess.
Chenoweth, E. G., Supt. C. D., C. R. I. & P., Haddon Hall.
Chidley, Joseph, S. M. P., N. Y. C., Traymore.
Clark, J. H., Supt. Floating Equip., B. & O., Shelburne.
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Cornish, E. E., M. M., M. K. & T., Arlington.
Coughlin, J. M., G. F. C. D., N. F., Llewellyn.
Coulter, J. M., M. M., A. & S., Haddon Hall.
Darden, C. M., Mech. Eng., N. C. & St. L., Dennis.
Darlow, A. M., Chalfonte.
Daugherty, W. E., M. M., M. & O., Traymore.
Davey, J. J., Gen. Boiler Insp., N. P., New Belmont.
Davis, J. E., M. M., H. V., Chelsea.
Davis, J. J., G. F., Penna., Lorraine.
Deal, Alonzo, Sr., Air Brake Inst., P. & R.
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Delcher, H. C., Insp. B. & O., Arlington.
Desmonds, James, F. E., D. & H., Ambassador.
Diehr, C. P., M. M., N. Y. C., Fredonia.
Dillon, Edward, M. M., C. Vt., Arlington.
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Edmonds, G. S., S. M. P., D. & H., Ambassador.
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Eklund, K. J., G. F., C. Vt., Arlington.
Emerson, Geo. H., Ch. M. P. & E., B. & O., Marlborough.
Ennis, J. B., American Loco. Co., Traymore.
Enoch, J. L., M. M., L. & N., Ambassador.
Featters, F. B., Genl. Supt., Union, Haddon Hall.
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Flynn, Harry, G. S. Air Brakes, D. & H., Arlington.
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Foster, Frank H., For. of Engines, B. & M., Princess.
Fowler, Geo. L., Craig Hall.
Fox, Harry G., Ch. Drafts, P. & R., Stanly.
Freeman, L. D., Asst. to Chief Mech. Officer, C. & O., Traymore.
Fry, L. H., Standard Steel Works Co., Brighton.
Fuller C. E., Marlborough.
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Greenough, Grafton.
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Hall, James, Chalfonte.
Hall, M. A., Supt. of Mach., K. C. S., Ambassador.
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Hardin, F. H., C. E. M. P., R. S., N. Y. C., Ambassador.
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Hoppe, Alfred G., Ch Mech. Insp., C. M. & St. P., Fredonia.
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Moore, William, M. M., Erie, Arlington.
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Morris, J. S., Asst. Eng., N. Y. C. & St. L., Ambassador.
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Owen, A. E., C. E., C. of N. J.
Owsley, C. W., Traymore.
Pack, A. G., Ch. Insp. Bureau of Loco. Insp., Shelburne.
Page, Chas. N., R. F. E., L. V., Sterling.
Parks, O. J., Mech. Rep., Gen. American Tank Car Corp., Ambassador.
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Peck, H. S., Train Lighting Maint., C. M. & St. P., Strand.
Peck, W. F., Supvr. Air Brakes, B. & O., Knickerbocker.
Perrine, W. M., M. M., C. of N. J., Dennis.
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Phetteplace, L. H., G. M., C. C. & O., Chalfonte.
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Poole, P. T., Dist. M. P. Insp., B. & O., Chalfonte.
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Silva, Geo. A., Gen. Insp., B. & M., Chelsea.
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Smith, R. D., M. M., Interstate, Watkins.
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Tate, M. K., Mgr. of Service, Lima Loco. Works, Chelsea.
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Teague, A. R., M. M., M. & O., Ritz Carlton.
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Thibaut, Geo., M. M., Erie, Ambassador.
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Thompson, E. B., Asst. Eng., C. & N. W., Deville.
Towner, M. E., P. A., W. M., Brighton.
Treacy, Geo., M. C. B., Ann Arbor, Strand.
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Turnbull, R. J., Asst. G. S. M. P., A. C. L., Traymore.
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Umpleby, C. H., M. M., N. Y. C., Shelburne.
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Vanawine F. S., Ch. Cl. to S. M. P., T. R. R. of St. L., Strand.
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Walker, J. W., Chf. Air Brake Insp., Penna., Pennhurst.
Wallis, J. T., Ch. M. P., Penna., Brighton.
Walsh, F. O., S. M. P., A. & W. P., Haddon Hall.
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Wildin, G. W., G. M., Westinghouse Air Brake Co., Chalfonte.
Wilhelm, E. E., V. P. & G. M., E. & M. R. & N., Ritz-Carlton.
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Williams, T. R., Asst. to M. C. B., N. P., Ambassador.
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Winterrowd, W. H., Traymore.
Woods, G. E., Supt. Car Wks., A. T. & S. F., Princess.
Wright, B. E., G. F., N. C. & St. L., Shelburne.
Young, J. D., M. M., C. of N. J., Princess.
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Shellenberger, R. M., Spvr. Agt., P. & R.
Smith, J. Donald, Marlborough.
Spangler, P. R., Adv. Agt., W. J. & S. S.
Stewart, G. R., Tel. & Tel. Eng., I. C., Haddon Hall.
Supplee, Furman B., M. C. B. Clerk, Penna.
Talbot, R. A., Traymore.
Titus, George, Store Dept., Penna.
Vought, Harry D., Sec., New York Ry. Club, Blenheim.
Walsh, F. O., Jr., Haddon Hall.
Walsh, Geo. G., Haddon Hall.
Waskow, Benj. A., Loco. Eng., C. M. & St. P., Lansdowne.
Watanabe, I., Engineer, South Manchuria Ry., Marlborough.
Williams, C. A., Patent Attorney, Bothwell.
Williamson, C. H., Supt. Tel., S. L. & S. F., Haddon Hall.
Wright, Geo. I., Eng., I. C., Traymore.

Division VI—Purchases and Stores

Daniels, O. V., Asst. G. S., Penna.
Driscoll, F. E., P. A., Erie, Traymore.
Morris, W. W., Asst. Pur. Agt., Penna.
Pace, R. T., P. A., A. & W. P., Traymore.
Reardon, F. C., Supt. Stores, D. & H., Ambassador.
Savage, T. E., Asst. to Mgr., Erie Ambassador.
Woods, J. L., P. A., N. C. & St. L., Marlborough.

Conventionalities

Evidently George W. Wildin has received inside information that there will be no ball game this year. He passed along the pier yesterday morning without his famous bat.

C. C. Lance, who has in the past attended many Atlantic City conventions as a railway man, is here this year as a special representative of the pneumatic tool department Ingersoll-Rand Co.

On account of the marriage of their son on June 14th, Mr. and Mrs. Walter B. Leach will not attend the convention this year. It is the first convention in 21 years that they have not attended and their familiar smile will be missed by their many friends.

H. V. McKedy of the Enrollment Committee, has recently been appointed a representative of the railway department of The Patterson-Sargent Company, Cleveland, Ohio, with headquarters at 30 Church Street, New York.

F. M. Nellis, of the Westinghouse Air Brake Company and secretary of the Air Brake Association, is tremendously enthusiastic over the meeting which was held in Montreal last month. Work is already being done in developing a strong program for next year.

J. E. McQuillen, mechanical superintendent of the Santa Fe at Galveston, Texas, is accompanied this year by Mrs. McQuillen. They were married in April of this year. Mrs. McQuillen was Miss Hortense Morris, of Galveston.

John F. Schurch, vice-president of Manning, Maxwell & Moore, Inc., is accompanied to the convention this year by Mrs. Schurch. "Jack" was president of the Railway Supply Manufacturers' Association when the convention was held in 1922, and in October of that year he was married to Mrs. L. Geno of Salt Lake City.

E. C. Wilson, sales director of the National Safety Appliance Co., who is attending the convention, is a son of W. H. Wilson, Assistant to vice-president of the Northern Pacific, and so strongly resembles his father that they might be taken for brothers. W. H. Wilson has attended many past conventions, but is not here this year.

It remained for the silver-tongued orator, George A. Post, to characterize in a word the present relation between Division V of the American Railway Association and the Railway Supply Manufacturers' Association, as compared with that existing when one party was the tolerated guest of the other. He calls the supply men *"liaison* officers."

J. J. Tatum, superintendent of the car department of the Baltimore & Ohio, is accompanied this year by his only son, Chauncey Roland. Chauncey is a student at Johns Hopkins University. He studied two years in the mechanical engineering department, but during the past three years has been taking a course in the School of Business Economics. He is scheduled to graduate next year.

C. H. Wiggin, mechanical superintendent of the Boston & Maine, among other things, is a strong booster for the Railroad Y. M. C. A. This year he led the membership drive for the Boston & Maine "Y" at Boston. The goal was 2,400, but Mr. Wiggin put so much steam into the campaign that the drive went way over the top and 2,610 members were enrolled.

John Draney, engineer of the Lackawanna, celebrated his thirty-ninth wedding anniversary on Tuesday evening and came to Atlantic City on Wednesday. He will stay throughout the conventions and will be joined by Mrs. Draney later on. John was recently re-elected president of the Lackawanna Veterans' Association and was presented with a high hat and a cane.

An old-timer, some centuries older than any of us, is said to have once asked the question: "Quis custodes custodiet?" which being interpreted, signifies; "Who is going to watch the watchmen?" The answer, so far as Atlantic City is concerned, is—John W. Conway!" He was observed making the rounds of the pier at 4 a.m. on Tuesday noting the efficiency or lapses of the watchmen employed to protect the exhibits from desecration.

F. W. Brazier, New York Central, who has taken active part in so many conventions as presiding officer, committee chairman or other operations for which a ready speaker has been required on short notice, was observed yesterday morning inhaling deep drafts of Atlantic breezes to get his speaking apparatus in order. He denies the assertion that he once rose to respond to the prayer with which the convention was opened.

The reason why the Hutchins Car Roofing Co. had no sign indicating the location of its exhibit until Wednesday afternoon was because the sign painter was of English descent. He appeared to think dropping an "H" out of the middle of the name would comply with cockney requirements and never be missed. It was at first thought that one of Mr. Thompson's wild geese had flown away with it.

F. W. Sargent, chief engineer of the American Brake Shoe & Foundry Co., blew in on Monday evening, and, in the spirit of facetious friendliness that has always characterized his greetings since the older days, referred to a business manager and advertising solicitor of one of the railway publications as "peripatetic." The latter was inclined for the moment to be grieved at the allusion. He thought Fitz said "very pathetic."

M. C. M. Hatch, general mechanical superintendent of the Missouri, Kansas & Texas, is proud of the record that his department has been making. A steady drive has been made to reduce the number of engine failures. During the month of April there were only 33 failures on the system, or one for every 33,000 locomotive-miles. In May the number of failures was reduced to 17, or only about half the number for the preceding month.

F. A. Butler, the new superintendent motive power and rolling stock of the Boston & Albany, is accompanied by Mrs. Butler. Mr. Butler succeeded R. D. Smith, who retired some months ago. This reminds us that Saturday, June 14, will be Flag Day. Mr. Smith always lost patience with us when we neglected to recognize this anniversary. Mr. Butler, being a good New Englander, will undoubtedly follow in Mr. Smith's footsteps. Flag Day this year will mark the 146th anniversary of the adoption of the national flag by the Continental Congress.

G. N. DeGuire, who succeeded Frank McManamy as manager of the Department of Equipment of the United States Railroad Administration, will be missed from the convention this year. Mr. DeGuire has just left the Rail-

road Administration to join Grand Chief Warren S. Stone, of the Brotherhood of Locomotive Engineers, in the banking business. He will be associated with the Empire Trust Company in New York City, which will specialize in loans to the railroads.

One of the speakers at the opening session in the Greek Temple yesterday morning stood up like a man, stated his name and railroad connection and made his remarks in a voice which could be heard clearly from one end of the room to the other. He was C. B. Smith, mechanical engineer of the Boston & Maine, and recently made a life member of the Mechanical Division. It is hoped that other members will follow Mr. Smith's splendid example.

M. A. Daly, fuel supervisor for the Northern Pacific, made a remarkable record as the presiding officer of the International Railway Fuel Association at its recent meeting. This association has grown rapidly in recent years, both in numbers and in strength. The large meeting room was crowded this year, and yet Mr. Daly succeeded in directing the discussion in such a way as to make it most effective. He will remain in Atlantic City throughout the mechanical convention and is accompanied by Mrs. Daly.

Dan Brady, juggling with figures, makes it out that Harry D. Vought, the triple cylinder secretary—New York Railroad Club, Central Railway Club and Master Boiler Makers' Association—must be 96 years old this year. It all comes from the fact that it was recently stated that in 1908 Harry celebrated his 40th anniversary as a newspaper man and in the same connection that this would be his 56th convention. Dan added them together and made it 96. If Dan is correct Harry carries his age remarkably well. He and Mrs. Vought, whose voice has often entertained convention attendants, are with us again.

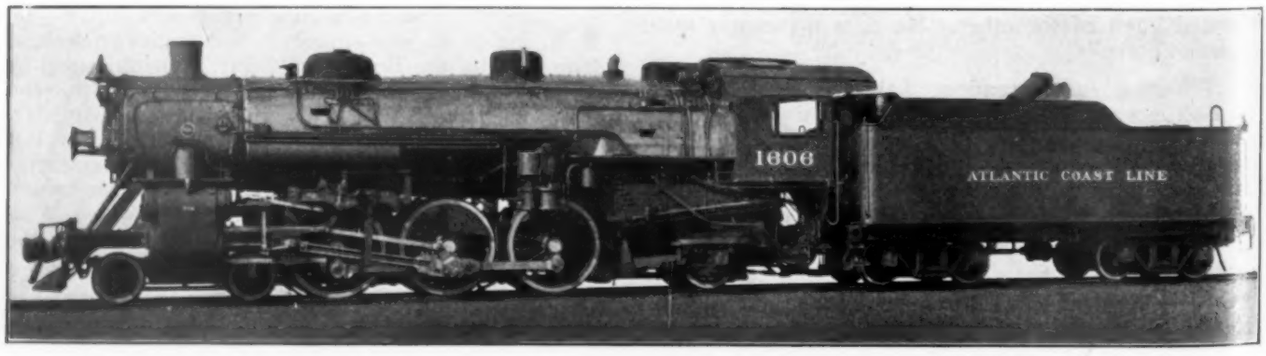
C. E. Chambers, superintendent motive power and equipment of the Central Railroad of New Jersey, and a past president of the Master Car Builders' Association, was surprised on Wednesday morning to receive a telegram stating that he had been unanimously elected president of the First National Bank of Roselle, N. J. Mr. Chambers is accompanied this year by Mrs. Chambers and their son and daughter. G. W. Rink, the assistant superintendent of motive power of the Central Railroad of New Jersey, is accompanied by Mrs. Rink and their five-year old son.

H. S. Patterson, manager of the railway department of the Walworth Manufacturing Co., who died about two months ago, will be sadly missed by his friends this year. Mr. Patterson was greatly interested in convention activities in years past; at one time he served on the Enrollment Committee. He was only 38 years old and was identified with the railway field for about 10 years, going with Walworth Manufacturing Co. when it took over the Kewanee Works of the National Tube Co. Sympathy is extended to Mrs. Patterson who in addition to the loss of her husband has the added sorrow in the death of her five-year-old son about two weeks ago.

Any writer of items for this department who happens to have a sense of humor always finds it easy to start a day's work by reading over what the printer has made of his laborious work of the day before. No words are absolutely safe from the printer's ministrations except "a", "an" and "the." Yesterday he put some "verbe brakes" into the aquarium where only "vertebrates" were before. The "Gould Conperi Co.," will of course readily be recognized as manufacturers of some new-fangled coupler; but the "Carmel Co." may not be so readily recognized as a bactrian camel with an extra hump. And the location of the Royal Gorge and the Grand Canon of the Colorado in the same place reflects upon the writer's geographical knowledge.

W. H. S. (Doc) Bateman, chairman of the Exhibit Committee, is receiving congratulations on every hand about the arrangement of the exhibit and the decorations. When the Exhibit Committee met to make space allotments last spring it was found that more than 114,000 sq. ft. of space had been applied and paid for. When the space allotments had been cut down as much as possible there were still several heavy machine tool exhibits which had not been provided for. This accounts for the building of the Arkansas Avenue Machinery Annex, which is variously designated as "Doc Bateman's Pavilion," "Doc Bateman's Hobby" or "the Bateman Annex." "Doc" Bateman's son, Stanley L., has attended the conventions for the past 17 years, coming to the first one when he was six years old. This year he is, for the first time, attending the convention in the capacity of a supply man—he is associated with his father at the Philadelphia office of the Parkesburg Iron Company; he is also acting as a member of the Entertainment Committee. Another son, T. Houston, who has also attended the conventions for many years, is now a special apprentice with the Baldwin Locomotive Works; he expects to find an opportunity to visit the convention over the week-end. Mr. Bateman has been attending the conventions for the past 28 or 29 years and in addition to his son, Stanley, is accompanied this year by Mrs. Bateman.

* * * * *



4-6-2 Type Locomotive with 69-in. Drivers for Use in Mixed Service, Built by Baldwin Locomotive Works

New Devices Among the Exhibits

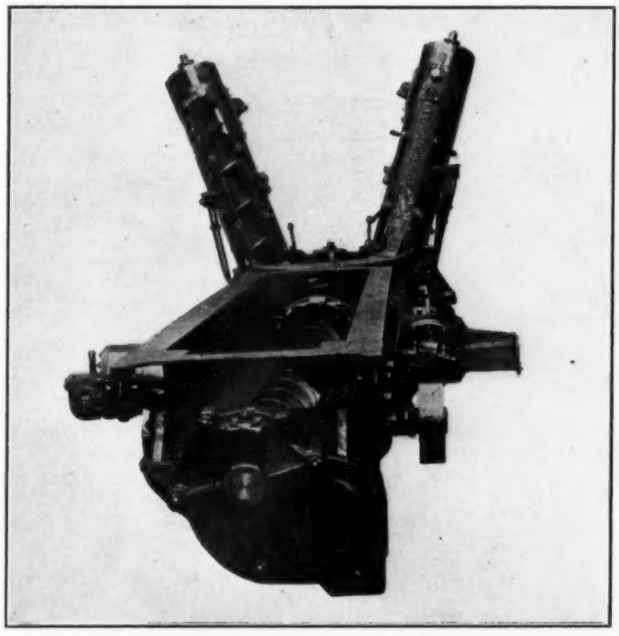
Type D-2 Duplex Locomotive Stoker

THE LOCOMOTIVE STOKER COMPANY, Pittsburgh, Pa., is exhibiting a modified form of the Duplex stoker, known as the type D-2, which has recently been placed on the market, and a number of them are already in service. The modification in the type D-1 Duplex stoker was made to meet the requirements of railroads where the weight limitations on locomotives made a stoker of lighter weight necessary. The type D-2 stoker, while not differing radically from the well-known type D-1, which it is not intended in any sense to supersede, is considerably lighter in weight and involves certain modifications in mechanical design for convenience of application in connection with appliances such as the locomotive booster, mechanical grate shaker, etc.

The transfer hopper of this stoker is arranged for three point suspension to the locomotive frame, and the third or rear foot is placed relatively high to permit raising the draw bar pin, a desirable feature in connection with application of the locomotive booster. There is also more clearance between the hopper and the mud ring, thus facilitating the application of grate shakers. The transfer hopper also carries the conveyor drive and reverse unit which is mounted in a large 9-in. bushing or drum, which can be readily pulled out of the transfer hopper back toward the tender, thus avoiding the necessity of removing the grate shaker cylinders when removing the conveyor drive and reverse unit. The D-2 hopper has a removable bottom cover which, in conjunction with the front portion of the transfer hopper, forms the rack housing and takes the wear of drive rack.

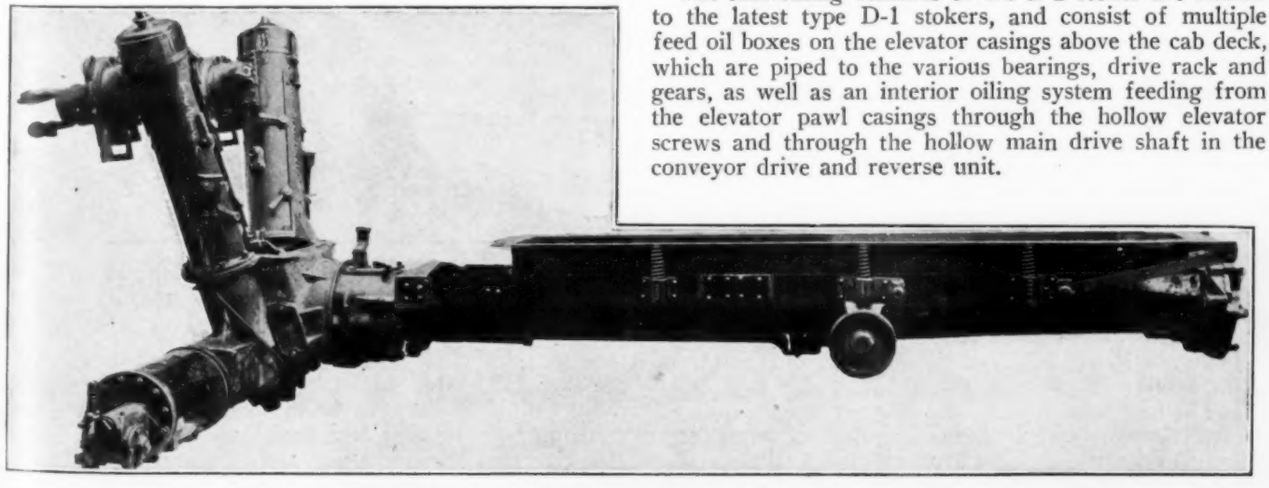
The elevator casings are made of steel tubing which materially reduces the weight. Both casings are equipped with full length casing doors running up beyond the height of the distributor elbows, for convenience in the removal of clogs, should a piece of foreign material in the coal cause the elevators to stall.

The elevators are also equipped with a coal dampening device to prevent stacks losses when firing fine, dry coal. Steam from the stoker exhaust line is directed into the elevators, moistening the coal and causing the finer particles to adhere to the lumps and fall to the firebed instead of passing through the flues partially consumed. Removable bottom elevator bearings facilitate the renewal of bottom elevator bushings when necessary and. improved design sealing rings and sealing ring caps are used in the hopper bottom at the base of the elevator screws. The tender unit on the D-2 stoker embodies the features of the latest type D-1 straight trough.



Rear View of the Duplex D-2 Locomotive Stoker Showing Doors in Elevators for Removing Obstructions

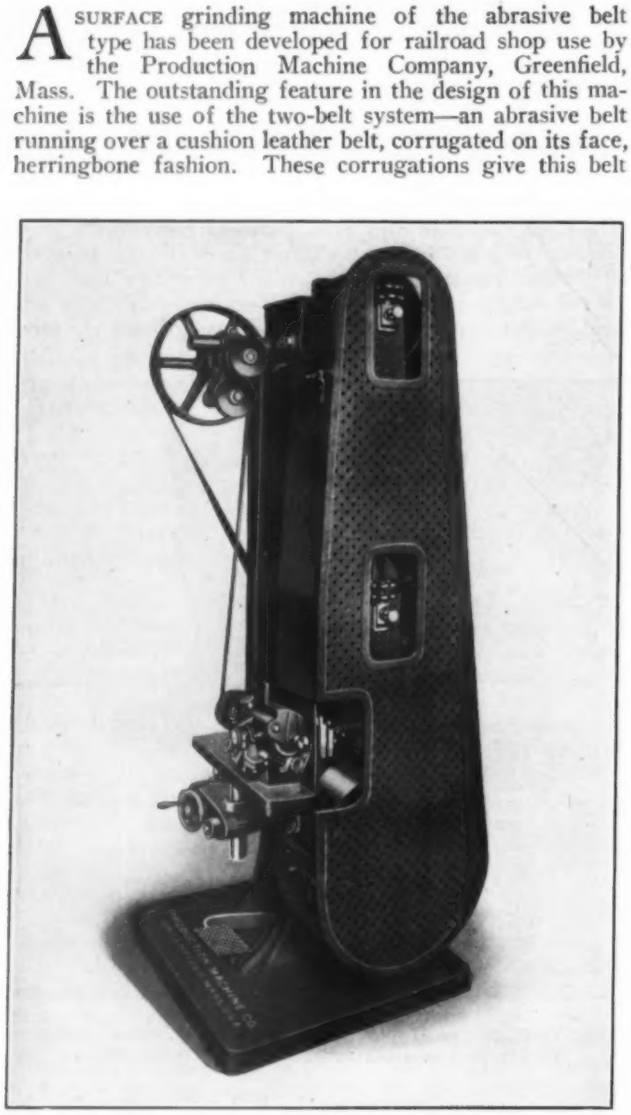
The lubricating features of the D-2 stoker are similar to the latest type D-1 stokers, and consist of multiple feed oil boxes on the elevator casings above the cab deck, which are piped to the various bearings, drive rack and gears, as well as an interior oiling system feeding from the elevator pawl casings through the hollow elevator screws and through the hollow main drive shaft in the conveyor drive and reverse unit.



General Arrangement of the Duplex D-2 Locomotive Stoker

Production Grinding Machine

A SURFACE grinding machine of the abrasive belt type has been developed for railroad shop use by the Production Machine Company, Greenfield, Mass. The outstanding feature in the design of this machine is the use of the two-belt system—an abrasive belt running over a cushion leather belt, corrugated on its face, herringbone fashion. These corrugations give this belt



This Machine Uses Abrasive Belts for Grinding

high and low points, the high points for cutting and the low points immediately adjoining for chip clearance.

A pressure platen operating back of the cushion belt serves to bring the belts to the work, which is either held rigid, or fed through the machine automatically. The corrugated leather cushion belt runs at a speed of 7,000 ft. a min.; the abrasive belt, slightly faster.

The pressure of the platen is adjustable, the forward movement being controlled by a foot pedal. Various forms of platens may be used to suit the work in hand.

A suitable table with a power feed roll mounted thereon is provided for the application of various fixtures and attachments. The rate of feed is regulated by the angle of the feed roll, which is adjustable in either direction from a horizontal position.

The Type A machine has been adapted in some railroad shops to the work of grinding boiler tubes before welding. The end of the tube is placed in the machine by the operator and the feeding mechanism rotates it, while the abrasive belt removes scale and dirt.

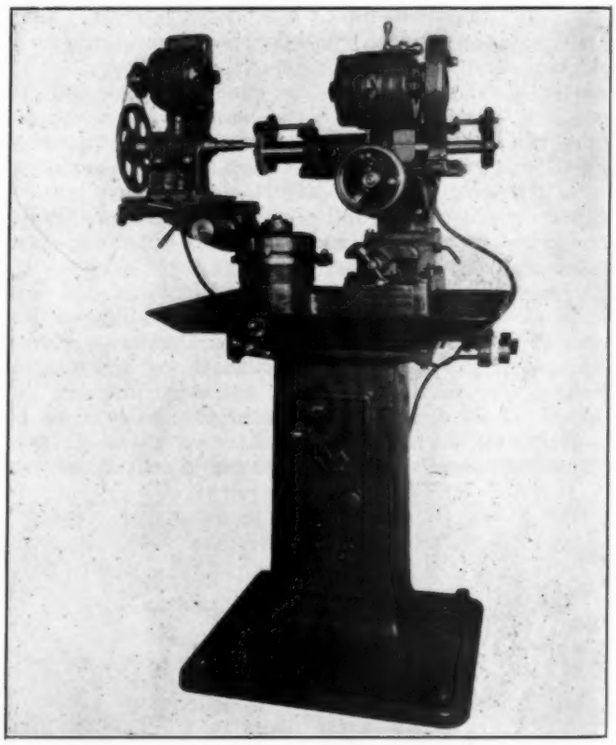
The type A machine is primarily adapted to external cylindrical grinding, has a capacity of ¼ in. to 4 in., and can be fitted with a heavy guide fixture for use with large diameter bars or long tubing.

A Combined Cutter and Radius Grinder

THE KELLER Mechanical Engineering Corporation, Brooklyn, has on display at its exhibit a new cutter grinder especially designed for grinding radii. The exclusive features claimed for the machine are the six separate control movements and the ability to grind radii at the same setting used for the rest of the grinding. The grinder makes possible the adoption and free use of milling cutters that are usually considered impracticable because of the difficulty of grinding them, such as ball-nose end mills and round-corner face mills.

Practically any type of milling cutter or reamer can be ground, and all commercial sizes. Tracer points can be very readily handled by using the cylindrical grinding fixture, mounted in place on the machine. By use of the same fixture and by swivelling the table to the desired position, a variety of small cylindrical, face, taper and angular work can be done.

The grinding spindle is mounted on three slides, which gives it movement longitudinally, vertically and trans-



A Cutter Grinder with Six Control Movements

versely. The hand wheel on the longitudinal movement is used to traverse the wheel when grinding cylindrical work and the straight teeth of cutters. Adjustable stops govern the length of stroke. All the slides have taper gibs. The grinding wheel spindle is mounted on ball bearings in a sleeve so that the whole unit is easily removable. It is driven by a ¼-hp. ball bearing motor, and means are provided for tightening the belt. A wheel is carried on each end of the spindle. The work holding structure is mounted

on a turntable, which can be swung through any arc up to 210 deg., and positioned by means of stops having adjusting screws. It is by the use of this swinging movement that any radius up to two inches can be ground. Mounted on the turntable are two slides at right angles to each other to give both radical and tangential adjustment for the work. The top slide forms a table on which the work holding fixtures can be mounted. The cylindrical grinding fixture already referred to is driven by a $^1/_{12}$-hp. motor through belts and cone pulleys providing five speeds. The end of the spindle is arranged for holding the tracer points as well as jaw or magnetic type chucks.

The machine is completely equipped for cutter grinding, and can be supplied with a number of attachments as extras. Its many movements make it adaptable to a wide range of work in the toolroom. Since the machine is self-contained, it can readily be moved about the shop to place it conveniently for the work.

Sander for Boosters and Electric Locomotives

The White American Locomotive Sander Company, Inc., Roanoke, Va., is exhibiting a special automatic device for sanding booster engines and electric locomotives. In the case of the booster engine the regular Graham-White sander is used but it is automatically controlled by means of a patented valve which takes its actuating pressure from the air control line of the booster engine while the pressure used for cleaning the pipes and sanding the rail is taken directly from the main pressure reservoir. This eliminates the human element in operating the sanders and makes the flow of sand to the trailer wheels simultaneous with the starting of the booster engine, thus preventing slipping, and therefore eliminating the shock when the trailer wheels finally get traction.

In case of electric locomotives the same automatic valve is used, but the actuating presure is admitted to the valve by means of an electro-magnetic valve controlled by a switch under the foot of the operator. In this case, also. the pressure used for cleaning the pipes and sanding the rail is taken from the main reservoir.

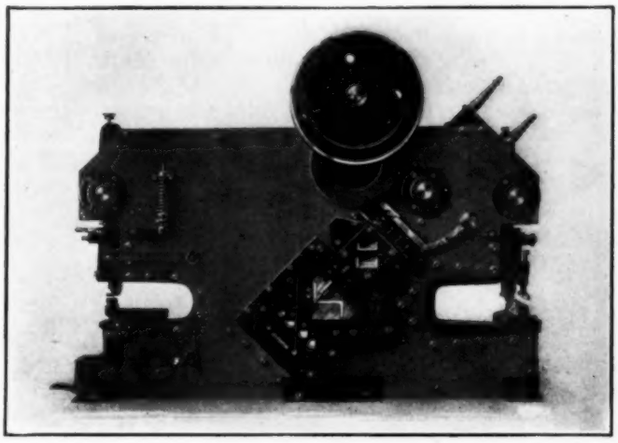
Universal Punch, Plate Shear and Channel Cutter

The Henry Pels & Company, New York, are presenting at their exhibit a new development in a combined punch, plate, bar, angle, tie, beam and channel shear. It is fully adapted to meet most of the requirements of railroad car or locomotive shops.

The machine has a high and deep punch throat to accommodate wide flange beams or wide plates and webs of wide beams. The punching head is of the full-floating type, accurate and rapid. It is adapted for a triple-gag punching attachment that will cope both the flanges or webs of beams or other sections.

The shearing end has a deep throat to handle wide plates and is equipped with an adjustable downholder that is quickly adjusted to varying thicknesses of material. Each blade for plate shearing has four cutting edges which are reversible with one another.

The center portion of this machine embodies a diagonal slide with three distinct and separate openings; one for bars of different sizes, one for angles and tees and one for beams or special shapes. The blades in the first two openings are so arranged that materials from the smallest up to the rated capacity can be sheared without change, while in the upper or third opening the blades for beams or special shapes can be quickly applied whenever needed. All of these center openings are provided with downholders and the angle and tee shearing opening

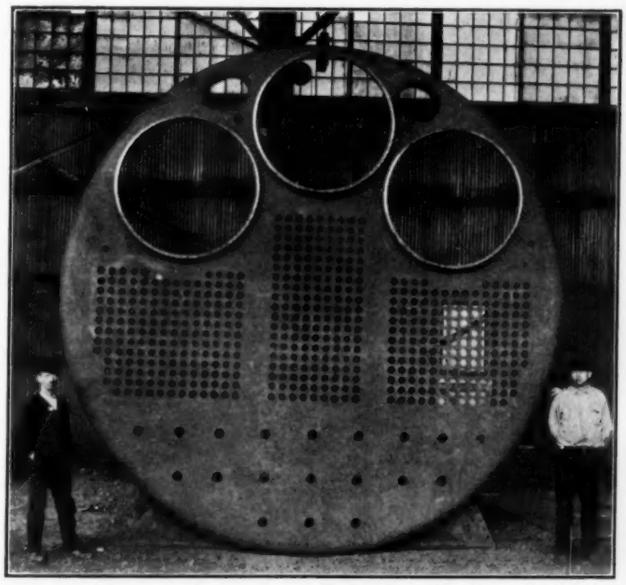


The Pels Universal Punch and Shear Has a Deep Throat Designed to Handle Wide Flanged Structural Shapes

is equipped with beveling or mitering tables and stops can be set for any angle from a square cut to a 45-deg. cut.

The angle, tees, beams, etc., are passed through the machine on the flat to enable easy handling and also when beveling angles or tees, the material is always in such a position as to be under complete control in all operations and tilted through the knife openings thus increasing the capacity and eliminating cumbersome handling.

* * *



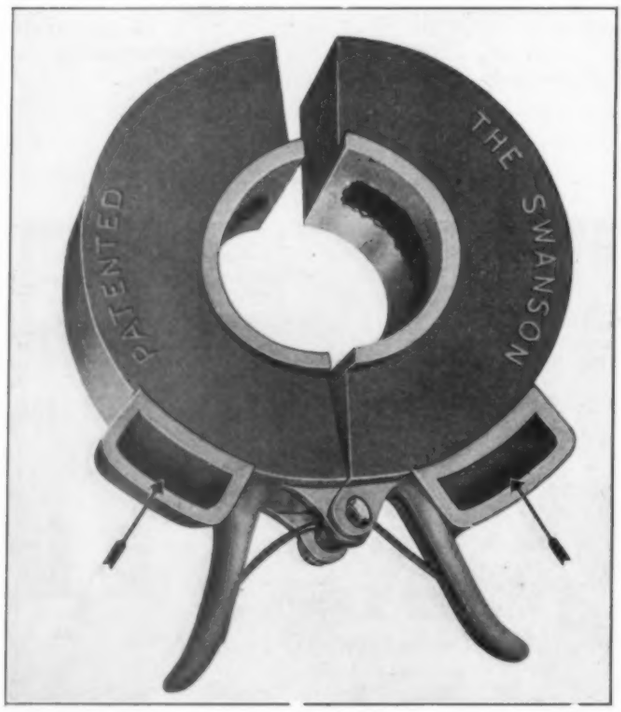
An Interesting Feature of the Lukens Steel Company's Exhibit is this 183-in. Marine Boiler Head, Which was Rolled on the Large 206-in. Plate Mill from a 22,000-lb. Ingot

The Badeker Metallic Packing

An interesting design of metallic piston rod and valve stem packing for locomotives is being exhibited by the Badeker Manufacturing Company, Chicago. It is built in two units, consisting of one single ring of packing and one split cast iron guard ring which eliminates the back spring, cups and retainers. This feature reduces the friction on the rods and the number of parts required to pack the rod. All the segments close uniformly, as their action on the piston rod is similar to the symmetrical closing of a three-jaw universal chuck. Uniform equalization of wear is provided for by the fillers at the ends of the segments being upset as the packing wears. They also hold the segments in a uniform position. The breaking of the packing in service is said to have been reduced to a minimum by the patented design and composition of the metals used.

Air Pump Piston Swab and Nut Lock

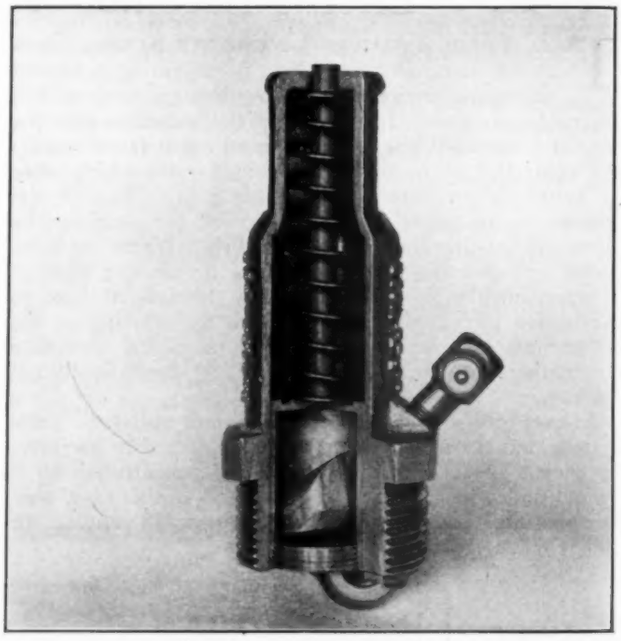
A device serving the dual purpose of lubricating air pump piston rods and of a preventative for the working off of pump packing nuts is being exhibited by the United Manufacturing & Sales Corporation, Denver. This device, known as the Swanson piston swab nut-lock is made of cast aluminum, is suitable for any size air pump and is made of the proper thickness to fill the space between the pump packing nuts, thereby eliminating the possibility of these nuts working off. The casting is cored out to provide an oil cellar in which a good grade of wool waste should be packed sufficiently tight so that it will come in contact with the piston rod through the opening at the top of the cellar, which is clearly shown in the illustration. This device is made in such a manner that it may be easily applied or removed. Oil cups indicated by the arrows have been provided for filling the oil cellar. An excellent feature of this device is the fact that it affords protection for the piston rod from dirt and cinders.



An Air Pump Swab Designed to Prevent Packing Nuts from Working Loose

Automatic Side Rod Grease Plug

The Diel-More Sales Company, Inc., Philadelphia, Pa., is exhibiting an interesting grease plug for use on locomotive side rods. This plug consists of a one-piece cast brass body, threaded at bottom to screw into rod openings and has mounted on its side a quick connection grease gun nipple. Inside this housing is a tightly closed hollow piston, containing a loosely mounted weight or hammer, free to move in an arc and actuated by the motion of the side rod. The hammer hinge is the only moving part to wear and it can be replaced at small cost. A rod projects through the top of the body; it is flush when the plug is empty and exposed in proportion to the amount of grease in the plug. The motion of the side rod causes the hammer to rise and fall once each revolution which drives the grease into the journal.



A Grease Plug Which Lubricates Side Rods Only While the Locomotive Is in Motion

This device provides a slow, steady, even flow of grease to side rod journals only while the locomotive is in operation. It is automatic and refilling approximately every 1,000 miles is the only attention required. It is refilled in one minute's time by a small, portable, hand operated pressure gun without removing the cup from the rod. The rate of feed is in direct proportion to the locomotive speed; the volume may be adjusted by increasing or decreasing the area of the feed holes leading into the journal. Practically any grade of grease or lubricant may be used.